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UNITED STATES NAVAL INSTITUTE PROCEEDINGS

OCT 3 1929

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Publication Office: Menasha, Wisconsin
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The writers only are responsible for the contents of their respective articles.

Editor, Captain R. C. MacFall; Assistant Editor, Lieutenant Commander A. H. Rooks.
Published monthly at 450 Ahnaip St., Menasha, Wis.
Executive, Editorial, and Business Offices, U. S. Naval Institute, Annapolis, Md.
Advertising Department, McGill Building, Washington, D.C.
Entered as second-class matter at the post-office at Menasha, Wis., April 4, 1922, and at the post-office at Annapolis, Md., under Act of August 4, 1912. Acceptance for mailing at the special rate of postage provided for in section 1103, Act of October 3, 1919, authorized March 13, 1922.
Membership dues (including PROCEEDINGS), $3.00 a year.
Subscription rate, $5.00 a year. (Foreign postage, $1.00 extra.) Single copies, 50 cents.

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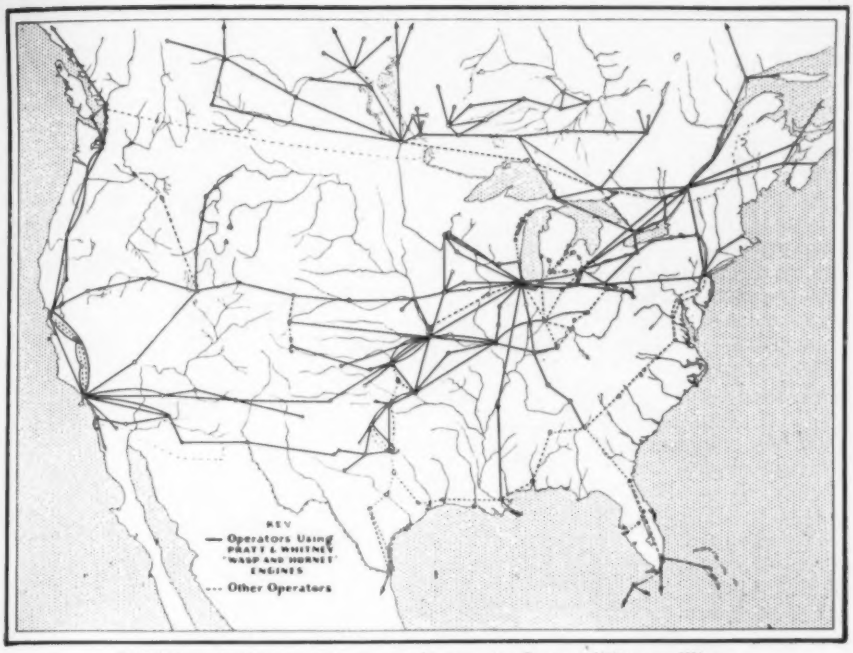

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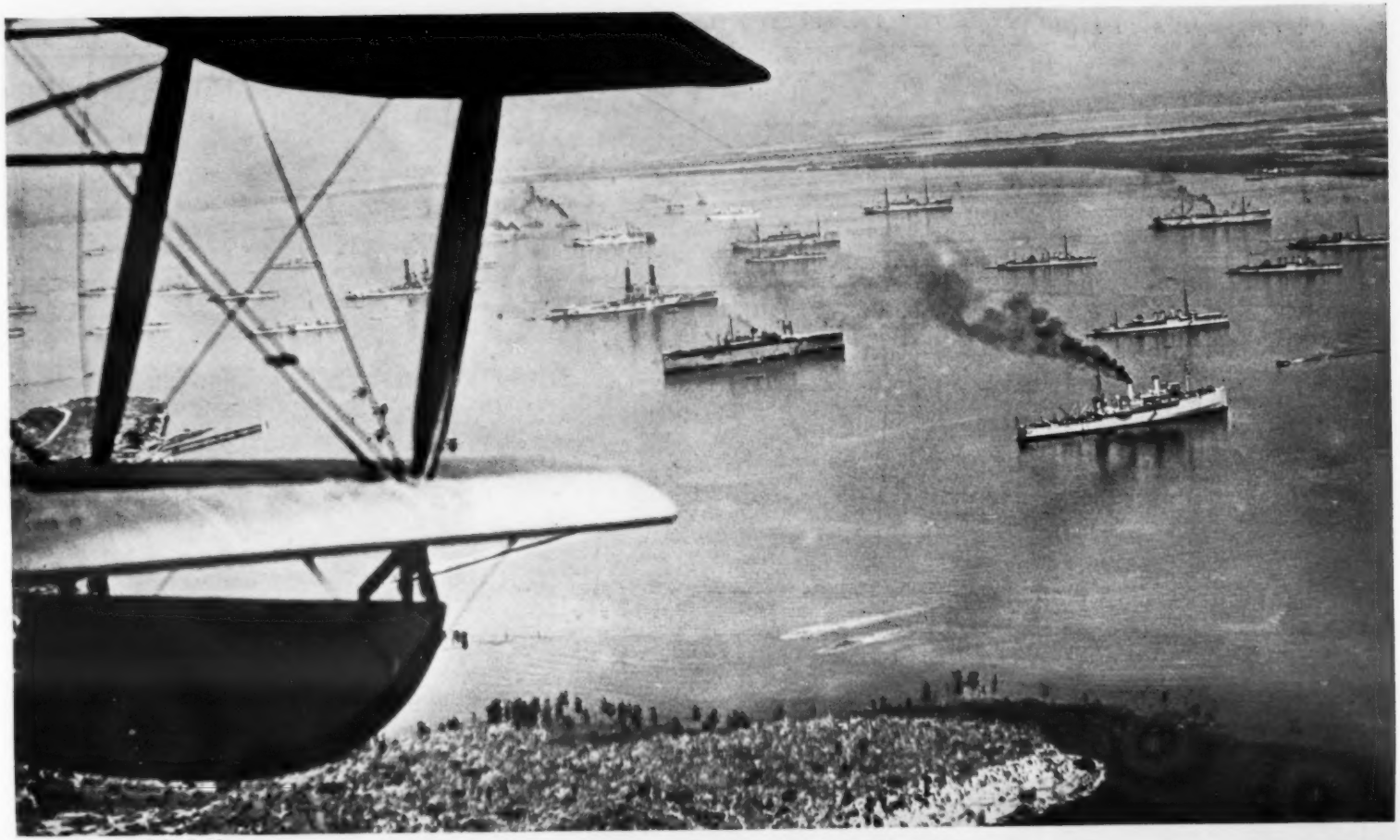

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THE SCOUTING FLEET, GUANTANAMO BAY, CUBA

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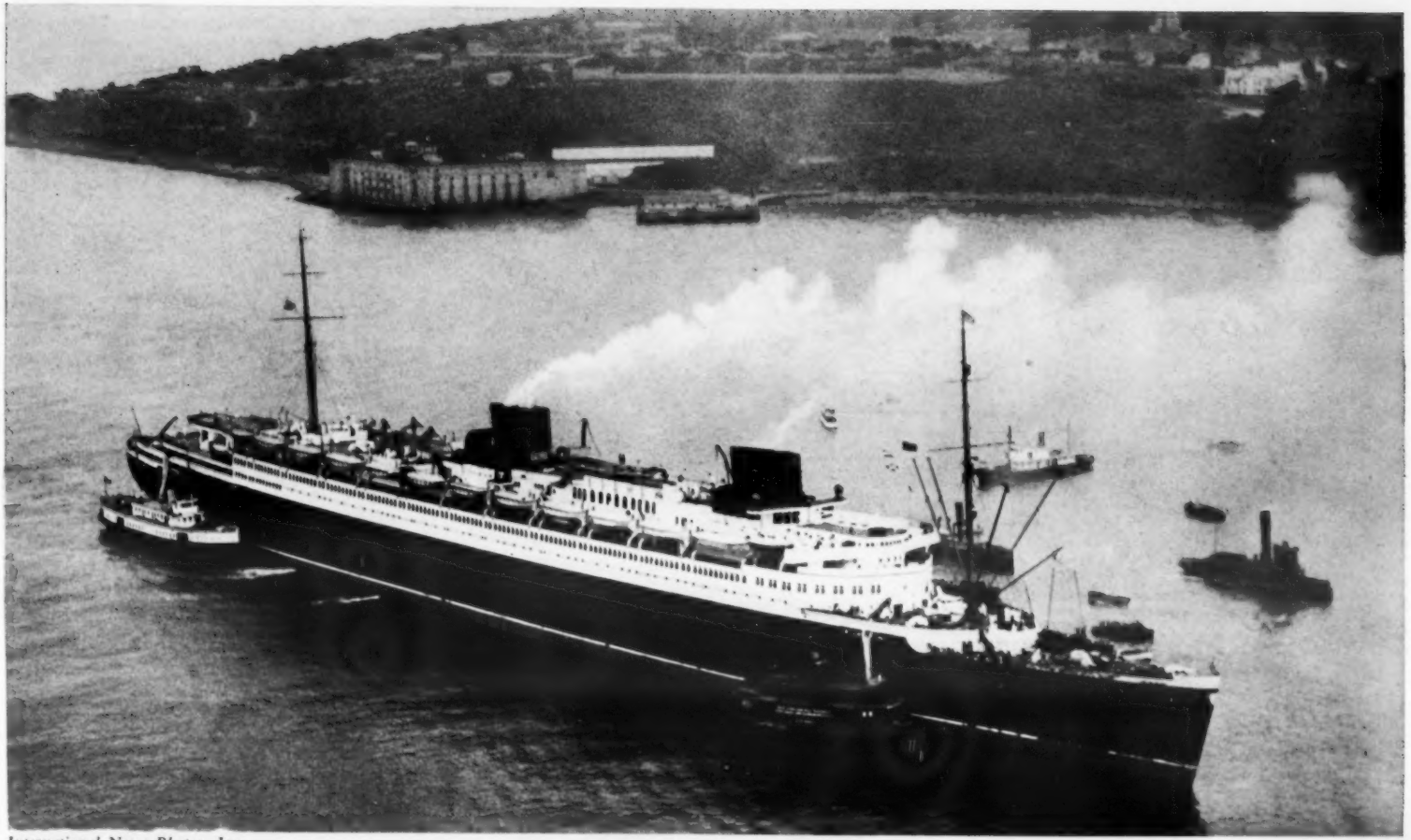
THE SCOUTING FLEET, GUANTANAMO BAY, CUBA

Courtesy Navy Recruiting Bureau, New York

BATTLE FLEET AT SAN PEDRO, ILLUMINATED FOR NAVY DAY



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THE GERMAN S. S. *BREMEN*

Of the North German Lloyd, which has upset all previous records of Atlantic crossings; her first western passage was made in four days and seventeen hours.

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THE GERMAN S. S. *BREMEN*

Of the North German Lloyd, which has upset all previous records of Atlantic crossings; her first western passage was made in four days and seventeen hours.

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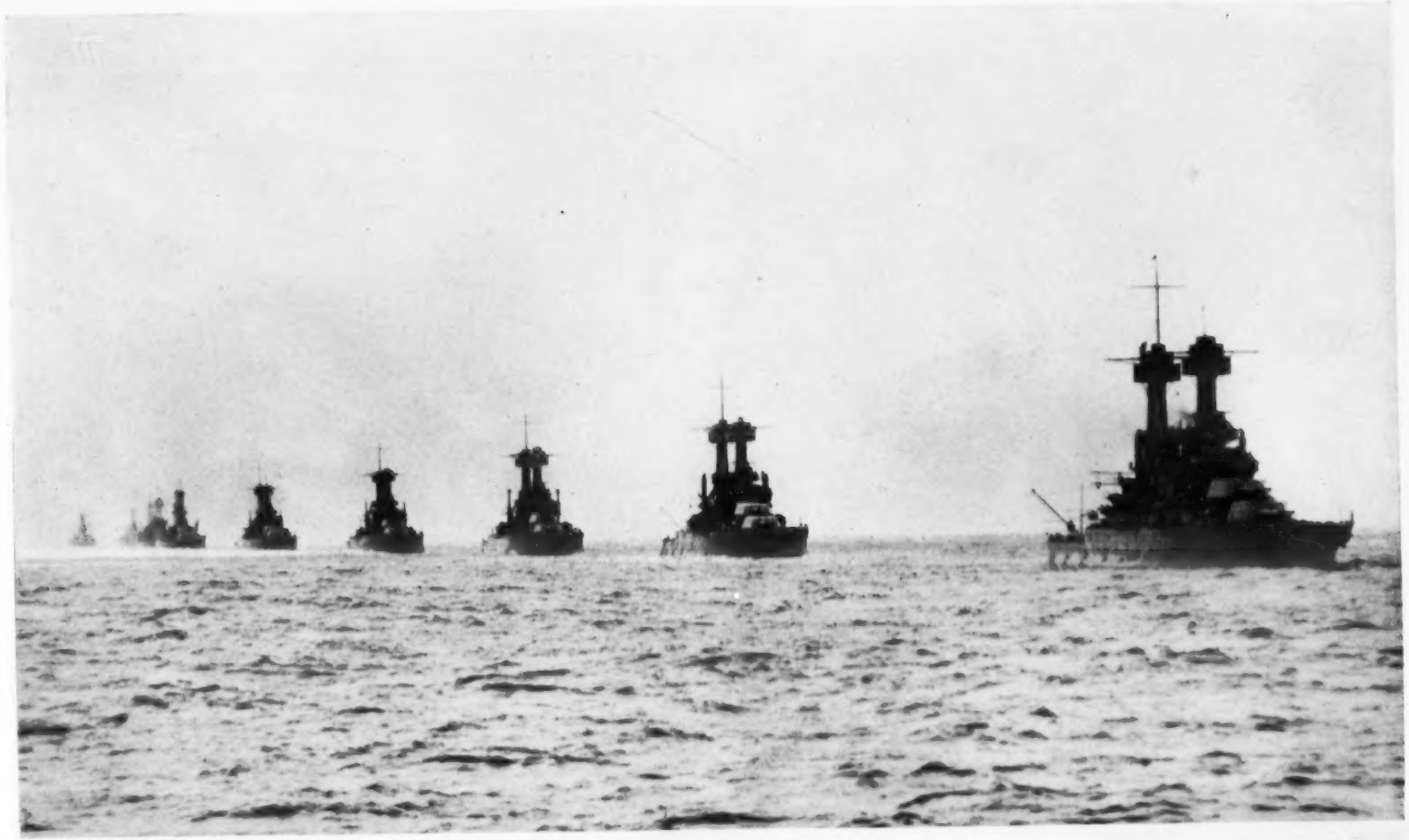
TWO OF OUR MERCHANT QUEENS

The coastwise liner *H. F. Alexander* (once fleet flagship) in the foreground, the *Malolo* of the Matson Navigation Company, in the background.



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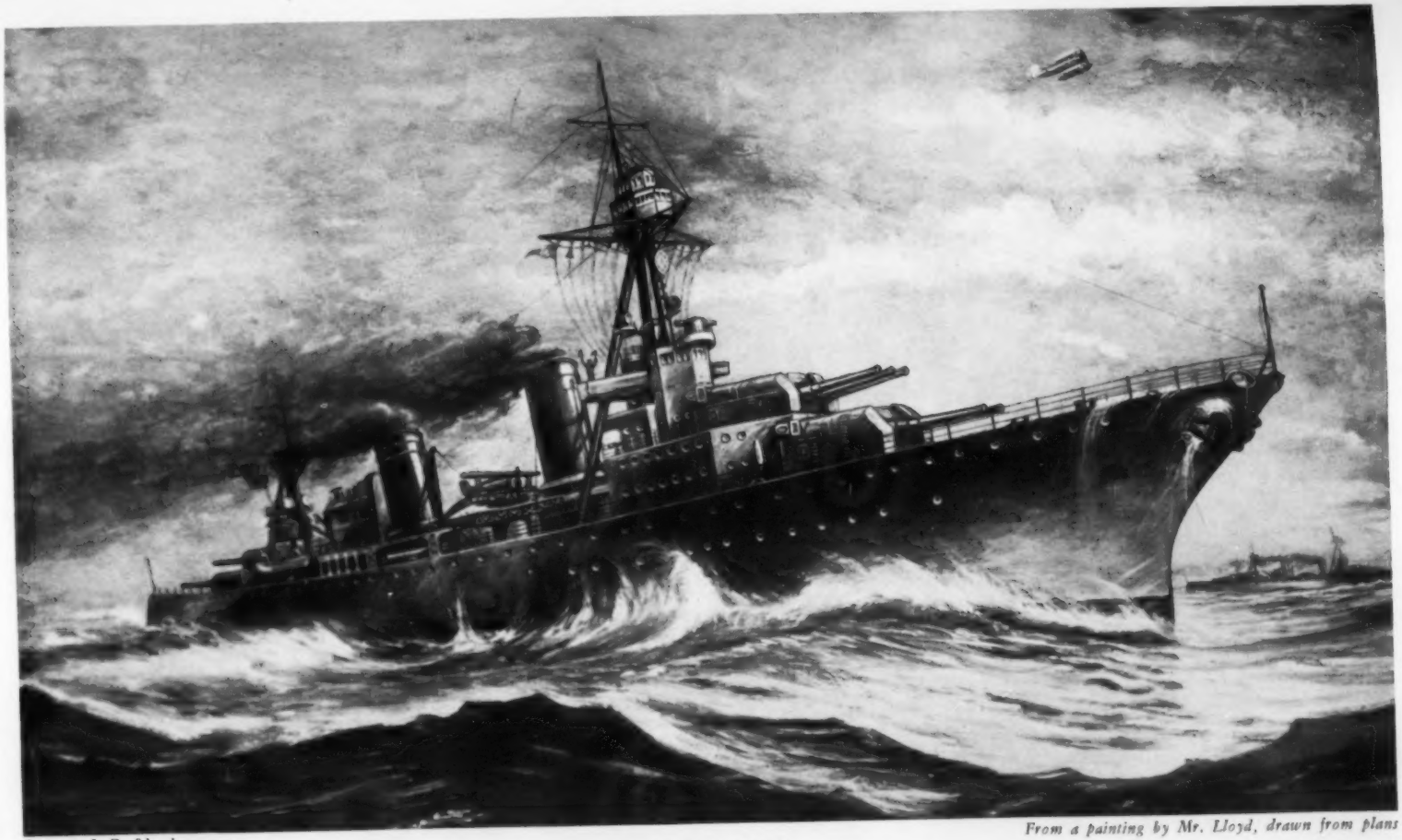
CLEARED FOR ACTION
Battleships grimly stand on for force practice.

Courtesy Navy Recruiting Bureau, New York

CLEARED FOR ACTION
Battleships grimly stand on for force practice.



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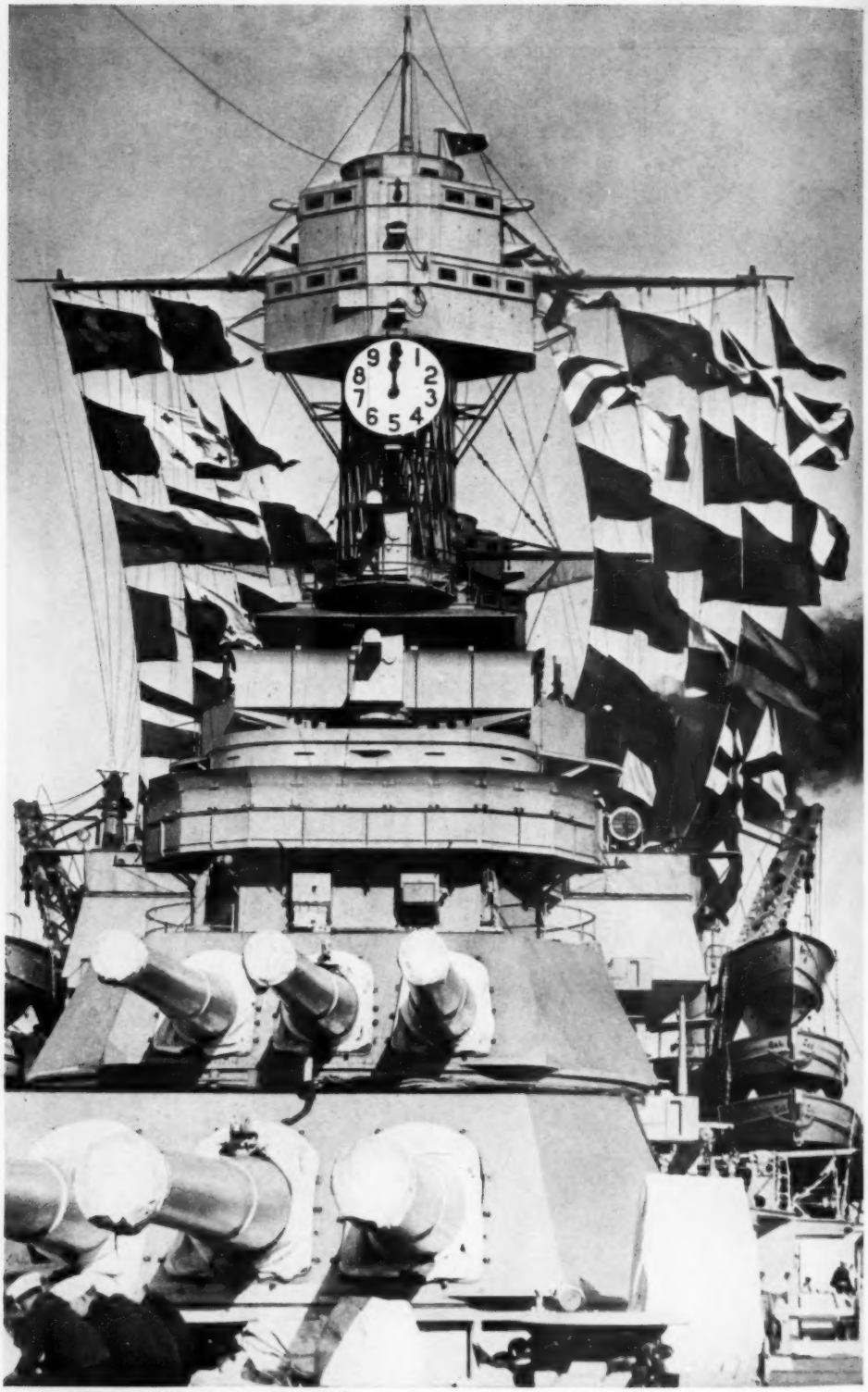

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UNITED STATES
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PROCEEDINGS

Vol. No. 55, No. 10 OCTOBER, 1929 *Whole No. 320*

Functions *of* Naval Power

BY WILLIAM HOWARD GARDINER
President of the Navy League of the United States

I

ALL sea power is divided in three parts, one ashore, another afloat, and the third in human understanding and direction. In other words, the basic elements that bring about sea power are of the land; they tend to express themselves on the seas and overseas; and such expression is profoundly influenced by the measure of understanding and direction given to advancing or retarding the tendency of the ashore factors to express themselves afloat.

It is not to be expected that the general public realize that the elements causing sea power are such seemingly unnautical matters as the geographic position of a country, its physical conformation and extent, and the numbers and character of its people—and that of their government. Such factors are primarily and almost wholly of the land. Nor need one understand seamanship, navigation, overseas traffic, and the intricacies of naval operations, and of their potentialities in influencing statecraft, in order to appreciate that a country virtually surrounded by oceans, producing more goods than it consumes and requiring increasing imports of crude materials and foodstuffs, will be obliged to traffic overseas—and should be intelligent enough to safeguard a traffic it is economically obliged to conduct.

On the other hand, those conducting afloat the maritime results of such natural, sociological, economic and political causes ashore should be expected to understand the land foundations upon which their seafaring activities rest and to the service of which their lives are devoted. And even more, public officials who assume to direct the shipping and naval conduct of a nation might well be expected to understand at least the elements of the science of sea power, ashore and afloat—a science that some evidently do not know is quite as broad and as basic as that of political economy.

But a study of the elements of sea power, of their interrelations and of their profound influences on human happiness, brings a realization that the mid-oceanic position of America, with all of our relations with other parts of the world immutably overseas affairs, is by far the best from which to carry on world-wide seafaring. For nowhere else is there a single country with the conjunction of such a central maritime position, such natural resources, such extent of territory, and so numerous a population. And furthermore, with respect to the character of a people, Mahan said:

> The tendency to trade, involving of necessity the production of something to trade with, is the national characteristic most important to the development of sea power.

When we realize that our economic productivity about equals that of all the nations of Europe west of Russia on the one hand, and that of all other parts of the world, on the other, we get some sense of the colossal

economic force here pressing to express itself in overseas trade. There is nothing surprising, therefore, in the fact that our external trade is already as world-wide and as great as that of any other single country. Indeed, our exports are already over 25 per cent greater than those from any other one nation and their production is said to support directly about a tenth of our population.

Sea-borne exports and imports to and from all parts of the world amounting to over eight billion dollars a year, and a coastwise trade carrying some six billion more, give us a sea-borne commerce that already exceeds fourteen billion dollars and is vitally important to every industry and home and person in the land. Naturally, such an unprecedented salt-water traffic requires great shipping facilities. And with competition for markets and for supplies becoming ever keener, the transport of merely a third of our trans-oceanic traffic has led to regular lines of American shipping reaching from our mid-oceanic base to all parts of the world over different lanes that total more than a hundred and fifty thousand miles in length and that require naval protection.

In short, the sequence in sea power is economic production ashore, then overseas trading, then more and more ships to carry it, and finally naval power supported politically by the internal economic interests that are expressing themselves externally in overseas trade and financially, in effect, by a fraction of the profit of that trade to the country.

II

It has been exceedingly interesting to note the rapidity with which a realization of such interests, and of their interrelations, has grown since the Washington Conference of 1921-22, first in the press and among business people, then more generally, and, latterly, in Congress. This growth is concretely illustrated by the accompanying map, and its insert, showing how Congress has responded to public pressure for support of the Navy in spite of repeated efforts on the part of former President Coolidge, torn between his beloved budget and his growing appreciation of sea power, to substitute paper programs for realities.

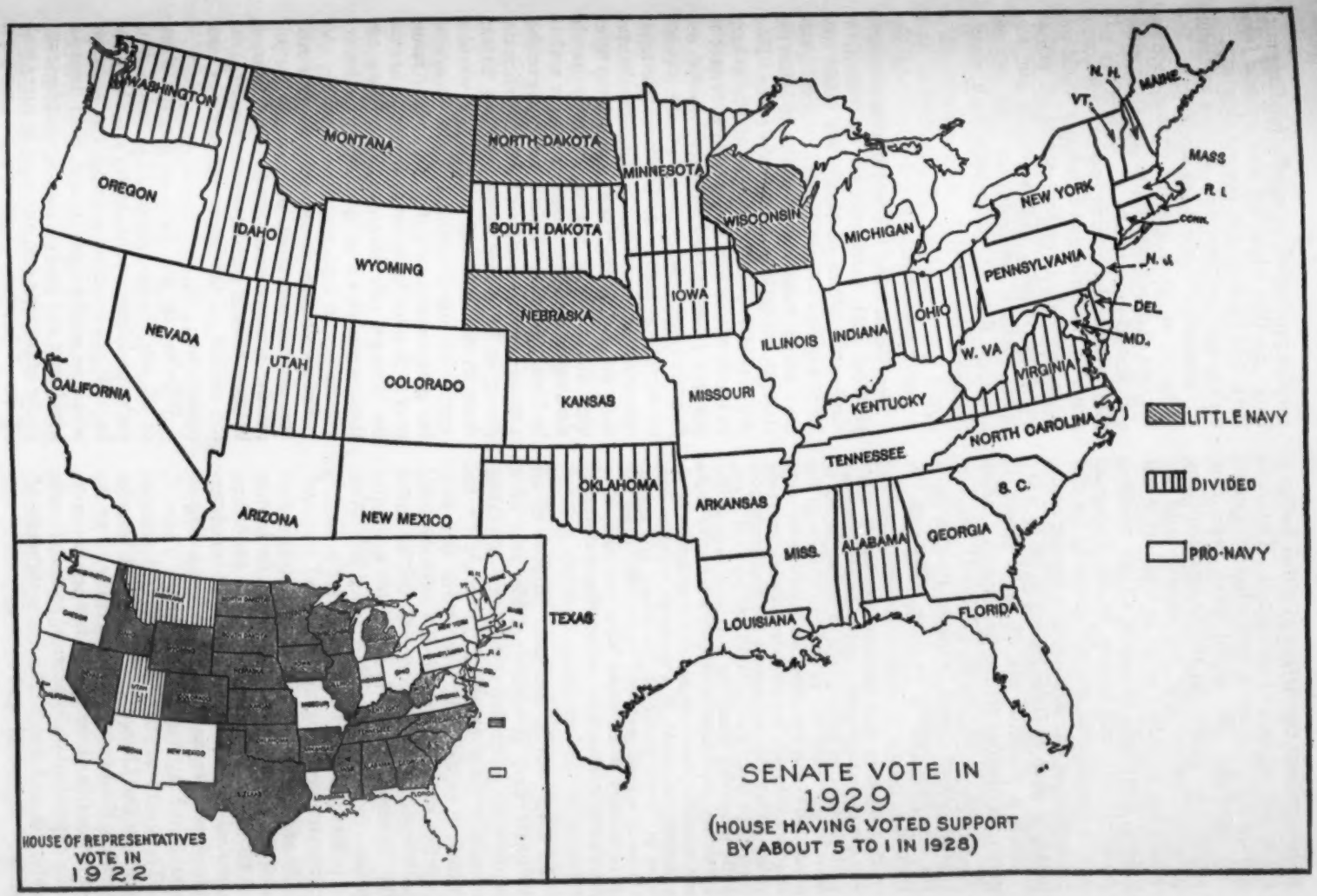
Another and equally interesting development has been the subsidence of talk merely about "coast defense" in Congressional debates on the Navy, while more and more appreciation of our world-wide economic interests, and of their safeguarding, is there expressed.

As all of this is the result of nation-wide economic and political pressure upon Congress from below, and in spite of the then President's striving to lead actually in the opposite direction, and as our overseas trading interests and consequent shipping are growing, it seems logical to consider the trend as well established on an increasingly strong politico-economic basis that will deal even more summarily with any future administration evidently opposing this trend than Congress dealt with Coolidge. But the point that it is desired to emphasize here is that, at last, Congress has realized that the function of a navy is to be adequate to safeguard our world-wide trade and shipping at all times because our home prosperity has become vitally dependent on our trade abroad.

III

From the outbreak of the late war in Europe, Allied propaganda disseminated here the allegation that it was Germany's heavy armament that brought on that war —and the spawn of that allegation is the present-day pacifist generalization that "armaments cause wars." Granted that an occasional policeman runs amuck, should one generalize that "police cause crimes" and that we should, therefore, disarm the law in order to reduce crime!

On the other hand, some realize that the lack of armaments, or military power, lead to assaults upon the integrity of a country or to a nation's being unnecessarily drawn into war. China is an example of such assaults and the United States furnishes the recent outstanding example of a nation's lack of adequate armaments resulting in its being drawn unnecessarily into a war. For in the Foreword to his *Intimate Papers*, the great Wilsonian apostle, Colonel House, says of the late war: ". . . . I was sure, given a large and efficient Army and Navy, the United States would have become the arbiter of peace, *and probably without the loss of a single life.*" Well meant but none the less misguided pacifist abhorrence of all things martial unquestionably prevented the United States from starting in, on the outbreak of the war in Europe, to prepare to safeguard our interests and to be the arbiter of peace by becoming manifestly adequately armed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HOUSE OF REPRESENTATIVES
VOTE IN
1922

to bring about the defeat of either belligerent by joining with its antagonist. Thus both groups of belligerents would have respected our interests and would have been constrained to submit to the peace-compelling potentialities of our armaments—and we would not have had to go to war. Is it not proper, therefore, to charge all our needless waste of life and money in the European war to the colossal mistake made by pacifist prevention of our developing adequate armaments to save us from having to go to war?

Such a peaceful use of naval power is given, in broader terms, by Captain Dudley W. Knox, U. S. Navy (Retired), in The United States Naval Institute PROCEEDINGS for last June, where he says, respecting the British:

> Their doctrine of a supreme navy, not to make war but to preserve peace, not to be predatory but to shield the free development of commerce, not to unsettle the world but to stabilize it through the promotion of law and order, has been demonstrated as sound. Britain has given us outstanding proof of the fallacy that armaments are necessarily provocative of war. For virtually one hundred years, while possessing much the strongest navy in the world, her government kept free from major wars and used her dominant naval power primarily as a commercial shield, in accordance with the doctrine of "trade protection" so wisely propagated. On many critical occasions during this period the mere strength of the Royal Navy was sufficient to deter other nations from undertaking war against her.

In other words, the main purpose of an adequate navy is somewhat like that of a competent policeman: to deter would-be criminals from breaking the peace by his manifest capacity to *force* them into subjugation to the rule of peace—wherefore the policeman, in some communities, is called the "peace officer" because he maintains peace—by force of arms if need be. And, in passing, it may be said that for a country circumstanced geographically and economically as is the United States ever to be drawn into war connotes the failure of its leaders to recognize and to secure the conditions essential to the maintenance of predetermined policies and to the safeguarding of established interests *peacefully*.

The maintenance of internal and external peace in the United States is a far broader problem than some seem to realize. For the economic life of our people has become critically dependent on imports of essential crude materials and foodstuffs from virtually all parts of the world, and upon exports of our surplus production to equally far-flung markets. So that while our own political frontiers, and those of our non-contiguous territories, are comparatively limited in extent, our economic frontiers are world-wide. For instance, about a quarter of our essential imports of crude materials come from within a thousand-mile radius of Singapore. If they were to be interrupted at their source many of our principal industries would collapse, with dire internal social as well as economic results. Consequently our economic defense problem involves assuring adequate flow of trade with such remote regions at all times.

IV

Bearing in mind the world-wide economic problem just mentioned let us consider in outline the series of tasks that would confront our Navy if, as is usual, political ignorance and parsimony have kept it below the strength necessary to maintain peace. Then the first task of our forces would be to keep as much of the war as possible as remote as possible from our vital centers, shores, and lines of communication—all of which would be mainly a matter of trans-oceanic naval operations. Thereafter would come the next task, that of forcing the enemy to stop fighting. This would not be done by merely shooing him off from our shores for a while by "coast defense," but rather by organizing a trans-oceanic counter-offensive sufficiently strong to force him to stop fighting, as was done in the late war in Europe where a successful naval counter-offensive against his submarines made it practicable to transport to France sufficient army forces to stem the enemy's offensive operations there and then overwhelm him by a counter-offensive ashore.

But as all such operations from our mid-oceanic position must, of necessity, be primarily trans-oceanic naval operations, it helps to have in mind even the merest skeleton outline of the major elements in naval operations.

Whether by sea, land or air, the object of all warlike operations is to bring about such conditions *in the enemy's country* that he will cease from seeking the ends for which he went to war or will yield those for which war was inaugurated against him; and at the same time one attempts to parry such efforts of the enemy against one's own coun-

try. But naval operations proper are virtually restricted to sea areas. So they seek to produce such results in the enemy's country, in the main, by depriving him of the use of the sea as a channel for his combatant and commercial movements, and of neutral sea-borne support, while assuring as extensive use of sea communications as may be needed for one's own maritime transportation of all kinds.

Such exercise of what is technically known as the "control" of military and mercantile transportation by sea is the ultimate naval operation toward the success of which virtually all others look. It is carried out nowadays, in the main, by battle cruisers, heavy and light cruisers, submarines, and aircraft, conducting dispersed cruising warfare. And while "control" operations include protecting commercial and military shipping, their main mission is to locate and stop enemy shipping and neutral shipping carrying contraband—a task in which airplanes, operating from naval vessels, can be exceedingly helpful by making high-speed flights of a few hundred miles and thus greatly extending the sea area over which each warship can exercise effective "control."

It should be realized, however, that aircraft alone could not fulfill such humanitarian requirements before sinking a ship as even submarines can. Furthermore, the radii of operation in the trans-oceanic undertakings with which we are concerned are far beyond the serviceable limits of aircraft, obliging the latter to be carried to the approximate scene of activities and there supported by naval vessels. And however great a part aircraft come to play, their main aim at sea will continue to be the "control" of sea-borne traffic because ships unquestionably will remain the principal means of carriage over the seas—for it would take about 4,000,000 trips a year of the largest airships now practicable to conduct the overseas commerce now transported for us by surface vessels in less than 10,000 trips.

Cruising "control" operations logically will seek to deprive the enemy of the use of whatever sea area may be most essential to his purposes—will strike at the root where his sea communications concentrate rather than snip at far-flung twigs. But the enemy's aim will be to defend an area so vital to him by a concentration of his naval power in the form of a battle fleet so based as to "command" his critical area in order to debar dispersed cruising vessels from effectively controlling traffic in it. Consequently, the enemy's battle fleet must be overcome—or contained near its base by the continued presence, in his critical area, of an obviously superior battle fleet of one's own—before the ultimate "control" operations of patrolling the enemy's critical area and blockading his access to the sea can be carried out with maximum disastrous effect upon the military, economic, social and political conditions ashore in his country.

Conclusive naval operations therefore call for three elements: a base so located that the fleet can maintain superior force in the enemy's critical area; a concentrated and preponderant battle fleet of capital ships and their auxiliary vessels and aircraft of all types, the task of which is to secure "command" of the enemy's critical area so that the "control force" can operate effectively therein; and *in addition*, a dispersed cruising "control force," consisting principally of cruisers, submarines, and aircraft, the task of which is to exercise conclusive "control" over all kinds of maritime transportation, in the critical sea area most important to the enemy, as well as elsewhere.

In other words, except for effecting an invasive landing, the ultimate aim of all fighting between naval vessels is in order to exercise control over enemy and neutral sea-borne traffic. From this it follows that any move toward the so-called "freedom of the seas," or other reduction of naval efficacy, handicaps this comparatively bloodless form of quasi-economic warfare afloat and consequently conduces to the more bloody invasive operations ashore by a belligerent having the will to win.

V

Recent international discussions warrant further consideration of the capital fleet and of the dispersed cruising control force.

The first task of the capital fleet is to prevent an enemy from securing command of one's critical area so that thereupon enemy cruising forces can exercise effective control over traffic in it; and the next task of the capital fleet is to secure command of the enemy's critical area so that one's own cruising forces can exercise such control over it as to most injure conditions in the enemy's country. In passing it may be

well to recall that certain extensive problems as to possible tasks of the American capital fleet seem to have led to perhaps a disproportionate concentration thereon to the neglect of the concomitant and ultimate problem of exercising defensive and offensive control over sea-borne traffic simultaneously in widely separated oceanic regions.

As has been previously implied, the capital fleet consists (a) of a battle force of capital ships to be used in concentration together as a heavy striking force and (b) of such auxiliaries to them as cruisers, destroyers, submarines and aircraft to act as scouts and defensive screens, for the capital ships, on the surface, under the surface and in the air, and occasionally as auxiliary offensive weapons; and, of course, each type of such auxiliaries, and each unit of each type, should be competent to perform its strategic and tactical tasks.

As the capital ships of the battle force may be considered as designed to act in concentrated conjunction with each other, their aggregate tonnage may be taken as a fair measure of their collective, or relative, power if all units are competent to perform such strategic and tactical tasks as may be required. On the other hand, even in the capital fleet, the efficacy of scouting and screening operations by all types of auxiliaries depends, to a considerable extent, on there being a sufficient *number* of these to disperse to quite widely separated positions, each unit, of course, being individually appropriate to and competent for its tasks. From this it seems to follow that, while aggregate tonnage may be a fair measure of a capital battle force, the criterion as to auxiliaries is whether there are sufficient *numbers* of them, each competent, for distribution as scouting and screening operations may require.

This is illustrated in a practical way by the fact that the formula for cruisers with the battle force that Admiral Lord Jellicoe gave at the Geneva Conference of 1927 was not, say, 45,000 tons of battle-fleet cruisers for every 100,000 tons of capital ships, but five cruisers for every three capital ships. In passing it is noteworthy that the British battle force of twenty capital ships thus calls for thirty battle-fleet cruisers whereas, worked out by an entirely different method based on positions, the American battle force of eighteen capital ships calls for twenty-eight cruisers attached to it—a closer check than is usually reached in Anglo-American naval problems.

But, in addition to the capital fleet and all such auxiliaries integral to it, we had to consider the dispersed cruising control force with tasks as widely separated as the oceans and the hemispheres. In the control force much more than in the capital fleet the problem is to have enough cruisers, or other craft of adequate individual capabilities, to distribute to many widely separated points where defensive or offensive control operations must be carried out. For such tasks a fleet of, say, forty cruisers of 7,000 tons each, aggregating 280,000 tons, would be far more effective, if supported by many bases to compensate for relatively limited steaming radius, than would be a similarly armed fleet of only twenty-eight cruisers of 10,000 tons each; for the forty cruisers could be in nearly 43 per cent more positions than could the twenty-eight.

VI

Turning to a specific phase of this, it is very interesting to note that the British fleet of modern cruisers built, building and publicly authorized, consists of forty that mount 6-inch guns and twenty-seven that mount 7.5 and 8-inch guns, or a total of sixty-seven vessels, whereas the United States has ten 6-inch gunners and is building or has authorized twenty-three that will carry 8-inch guns —a total of but thirty-three modern cruisers, only the ten smaller of which are completed. If we segregate thirty British cruisers, according to the Jellicoe formula, to their capital fleet, they would have thirty-seven left for defensive and offensive dispersed cruising control tasks whereas segregating twenty-eight cruisers to the American capital fleet would leave only five American cruisers for corresponding control tasks—when all American cruisers now authorized by Congress are completed.

Setting aside the capital fleets, this means, in terms of naval control operations, that there would be thirty-seven British cruisers available to protect British sea-borne trade, and to destroy that of the United States, whereas there would be only five American cruisers to (nominally) protect our trade—to say nothing of offensive operations. When it is recalled that the sea-borne commerce of the United States is just as world-wide and

considerably greater than that of the United Kingdom or that of the British Empire, there seems to be a lack of balance in their having over seven times as many cruisers, as well as many more bases, for the protection of their trade than we have for the safeguarding of ours. And inevitably such a merely nominally guarded trade as ours would be swept from the seas overnight by their regular cruisers plus their similar preponderance of fast, armable merchant ships, whereas we would be virtually impotent defensively and totally incapable of inaugurating those offensive control operations essential to victory.

VII

We are told, however, that, because of expense, every step possible must be taken toward naval reduction.

An official of very high political position, but one new to naval problems, emphasizes a possible building program of $1,170,000,000, while subordinating the fact that such a contingent expenditure would be spread over fifteen years. But $1,170,000,000 spread over fifteen years gives an average of only $78,000,000 a year—hardly a staggering amount to a government that enjoys annual surpluses reckoned by the hundred million. And when we recall that the present annual income of the people of the United States is about $90,000,000,000 and undoubtedly will average over $100,000,000,000 during the next fifteen years, the expenditure of $78,000,000—or 78 cents out of every $1,000 of income—is not an alarmingly heavy premium to pay to assure the safety, peace and prosperity of the United States.

The present-day money value of our naval vessels amounts to about $1,200,000,000 and that to replace them systematically, year by year, once in every twenty years, would call normally for an average annual expenditure of $60,000,000. So the conjured terrors of a contingent program calling for $1,700,000,000 (in fifteen years) wash down to a possible increase of merely $18,000,000 a year over normal replacements.

In contrast to such statements let us look at the cost of all armaments to the people of the United States in comparison with their other expenditures for government.

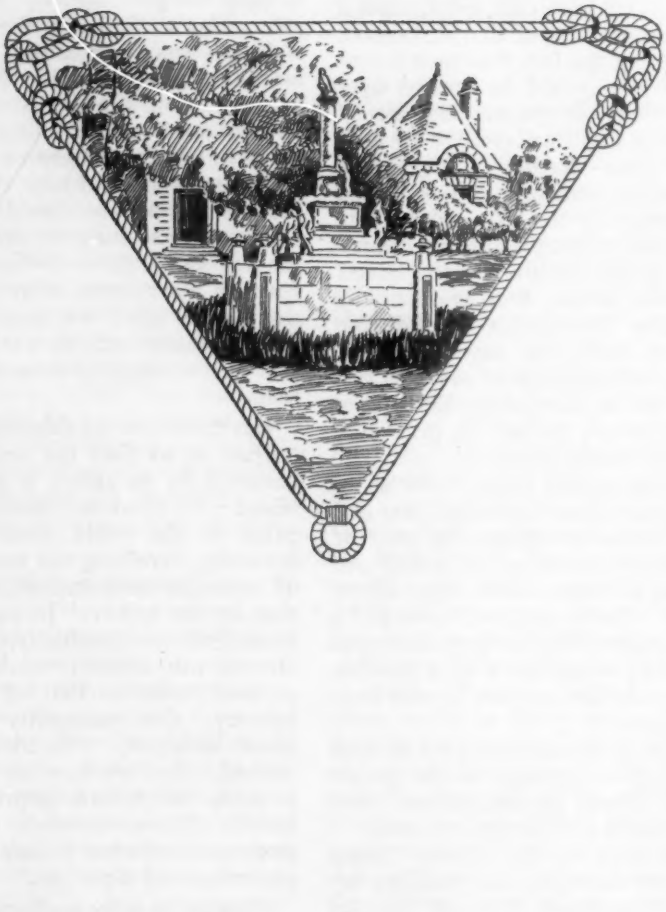
In 1927 the cost of the United States Army and Navy including non-military activities was $679,000,000, although in 1903 it had been only $228,000,000. But according to a recent publication by the National Industrial Conference Board, in 1903 the total expenditures of our federal, state and local governments amounted to $1,570,000,000, or 7.7 per cent of our then national income, while by 1927 our cost of government had increased to $12,000,000,000 and was taking 15.8 per cent of our national income. This means, in terms of present-day money, that while our disbursements for arms rose from $4.00 to nearly $6.00 per capita—largely because of more expensive mechanical equipment—we allowed our other governmental expenditures to multiply more than threefold, from about $30 to almost $94 a head, an increase of nearly $64.

It is noteworthy that the relative cost of our martial establishment has dropped from 14.5 per cent of our governmental outlay in 1903 to only 5.8 per cent of what we spent in 1927 for government. But it is far more interesting to find that the net increase for civilian purposes is almost $64 per capita—and that this net increase for civilian government alone is nearly eleven times as great as our total current costs for armaments. Government expenditures that amount to $100 per capita and take 16 per cent of our income may well be considered onerous. But common sense suggests reducing materially the $94 we lavish on civilian government before we worry over much about the reduction of the $6.00 we spend on national defense to assure our peace with nations abroad and our consequent economic prosperity at home.

But there are considerations far more important to us than the costs of armaments. America is, in effect, a great mid-oceanic island with all of our relations with all other parts of the world trans-oceanic and, of necessity, involving the conduct and control of overseas communications of all kinds—that is, sea power. In our broad base we have developed productivity to the point that already our overseas trade is as great and as world-wide as that of any other single country. Our prosperity at home has become intimately dependent on our trade abroad. And we have at our command, on a scale heretofore unprecedented in the world, all the elements that produce sea power, except what Mahan called "intelligent governmental direction."

Foreigners more sophisticated than we are,

seeing this, and realizing the determinative rôle that sea power plays in national prosperity and in international relations, have naturally sought to curb our almost automatic expression on the seas, and consequent influence overseas. But we should realize that as we have in incomparable measure all the elements of sea power—except understanding—and as our great prosperity at home and influence abroad depend on sea power, any move that reduces the effectiveness of any expression or factor of sea power will handicap the United States more than it will any other country and consequently will be counter to the ultimate interests of our country.



The Navy *and Its* Communications

By CAPTAIN S. C. HOOPER, *U. S. Navy,*
Director Naval Communications

IN AN address before the annual convention of the Institute of Radio Engineers, held at Washington during May, 1929, Doctor Lee De Forrest emphasized the phenomenal growth of the radio industry and pointed out the great progress recently made in the radio art. He reminded his audience that the parent, radio, had recently acquired two progeny: television and voice reproduction. This brings to mind the very considerable part played by the Navy.

The Naval Communication Policy is as follows:

To maintain and operate a naval communication system based on the requirements of the fleet in war.

To reduce by thorough indoctrination the number and length of communications.

To provide and operate radio compass stations as required.

To develop such radio communications as may aid maritime and aviation interests.

To coöperate with the radio and cable organizations of the United States and other countries and to safeguard the communication interests of the United States both public and private.

To develop and maintain within the fleet the best forms of communications for battle efficiency, stressing aviation and submarines.

To use naval radio communications to assist in the furtherance of American interests abroad.

Naval communications provide the nerve system within the fleet, and connecting the fleet with the Navy Department and district headquarters, over which information flows, and over which orders are given. The service must provide for instantaneous multiple distribution of orders and information to the various forces over wide areas and regardless of disposition; direction finding; radio tracking; tactical and strategical communications; communication through deliberate interference; creation of interference; speed; accuracy and secrecy of communications; communications on the surface, in the air, and submerged; interception of enemy traffic; interception of own traffic; and communication of spots from aircraft spotting for firing ships.

Our Washington Radio Central handles an average of 1,200 messages daily, and keeps in constant touch, through the Naval Communication System, with the entire Navy. It is possible to deliver a message to the entire Navy, ashore and afloat, regardless of distribution of ships, in two or three hours. During Mr. Hoover's South American cruise, the *Utah,* on which he returned from Montevideo, was in direct communication with Radio Central, Washington, during the entire voyage, except during three hours daily for the first three days out of Montevideo. An average of 10,000 words of traffic a day was handled to the United States from the Hoover ship.

In cases of urgency the commander in chief of the Asiatic Fleet has been able to ask a question of Washington and receive a reply in twenty minutes. The average time of traffic delivery from the Asiatic Station to San Francisco is approximately two hours.

During a year, the Shore Communication System handles about 100,000,000 words of traffic. About 25 per cent of this is for other departments of the government. This amount of traffic handled for other departments will probably be considerably reduced in the near future, should the Army continue duplicating the Navy's overseas circuits. The Navy Department and the Weather Bureau transmit a high-frequency weather broadcast, which gives aviation activities complete weather information about fifteen minutes after the Weather Bureau at Washington gets the telegraph and cable reports. This broadcast is of much value to meteorologists in making local predictions and at some

air stations permits flying about two hours sooner than was formerly customary. Hydrographic bulletins, and warning of dangers from derelicts, ice, etc., are also broadcast from various traffic stations. The time service given by radio from the Naval Observatory is most important. The lags of radio time signals are recorded on chronographs at the Naval Observatory. The signals from the Washington transmitters are so accurate that they are used for determination of longitude and other scientific purposes as well as for navigation. At the present time surveying parties are using this service in Alaska and in Venezuela. By ear, time signals may be received with one-tenth second error but for more accurate reception chronograph recorders are necessary.

The naval radio compass stations furnished 214,650 bearings during the fiscal year 1928. These stations fall into two classes, namely, strategical stations and others. It is the policy to close the latter whenever they are no longer required for navigational purposes, inasmuch as the Department of Commerce has adopted the policy of establishing radio beacons which the Lighthouse Service considers more useful than compass stations.

Our interest in the naval radio compass stations is primarily in their value as part of the intelligence service during war. These stations take about six men each, so if they did not have strategical value the Navy could not afford to assign so many men to this duty.

The Navy operates a radio broadcasting station at Washington whose programs are passed upon by the Interdepartmental Radio Advisory Committee and by the Secretary of the Navy. The Radio Act of 1927 contains an article which is intended to prevent broadcasting stations from being used for propaganda for one political party without giving equal rights to the other. Care is taken that the NAA broadcasting is used only to send out programs which are of general public interest, and which neither contain propaganda nor relate to politics. This station is used for time, weather, public health talks, and for bulletins from the Department of Agriculture. The Pan-American Union and the Library of Congress broadcast musical programs from this station. Balboa also broadcasts programs for use in the Republic of Panama and the Canal Zone.

Backing up our system on shore is the Volunteer Communication Reserve, consisting of about 1,500 reserve officers and men, who receive our instruction bulletins, hold regular drills under our district commandants, and mobilize voluntarily in emergencies to keep communications open where commercial facilities are crippled. These men serve through interest and patriotism alone, and deserve every encouragement. Their services in war time will be vital, and only through the drudgery of peace-time drills do they become qualified to take their places promptly in case of need.

The purpose underlying the organization of the Naval Reserve is particularly applicable to the highly specialized branch of the Volunteer Communication Reserve. The Naval Communication Service demands personnel of the highest technical and operating ability. It is not enough that skilled commercial operators be enlisted after the outbreak of war. Insofar as available, these will be used to the fullest extent possible, but an additional communication reserve, the personnel of which are already familiar with naval procedure and apparatus, is necessary. This is being provided for by the development of the Volunteer Naval Communication Reserve. This has the mission of the procurement and training of officers and men who will be available for naval communication service in war.

The total authorized enrollment is 844 officers and 6,900 men assigned to the several naval districts. The district commandants have full freedom to organize their quota into sections and units as will best provide a volunteer naval reserve communication network throughout the district. There is a master control station which ties in all the reserve stations to district headquarters. A reserve communication officer is the representative of the commandant in administering the district organization. The facilities of the Fleet Naval Reserve are utilized wherever practicable. A special high frequency, together with harmonics, has been made available for use by stations of the reserve organization. That a truly effective network has been built up is demonstrated by the real service performed by the Communication Reserve during the destructive hurricane of September, 1927.

During the World War many officials of the large communication companies were enrolled in the Naval Reserve and these per-

formed notably effective work. How much more valuable will the present reserve officers be as a result of their training? In addition to their drills, officers and men may have the advantage of an annual cruise. Insofar as available funds permit, selected officers will be ordered to a temporary tour of duty in the Communication Office of the Navy Department. Here they will be trained in all phases of practical communications which will tend to fit them for their prospective service as communication officers ashore in time of war or national emergency.

Until the termination of the World War, because of the foresight of forty years ago, England dominated the cables of the world and gained tremendous advantages in world trade and business. As far back as 1910, we have knowledge that England made definite plans to encircle the globe with a radio system in order to maintain her communication monopoly. An imperial communication commission was established, consisting of some of the most eminent business men and engineers of the empire, to advise in this connection—a volunteer board, which has been sitting at frequent intervals ever since its formation.

During the World War radio became an important factor in international communications, and at the conclusion of the war, five transatlantic radio circuits and two transpacific radio circuits, the American terminals temporarily in the hands of the United States Government, were in operation. Through government action, an American company was formed, through control of patents, and the taking over of these stations was the beginning of a successful effort for this country to occupy a commanding position in world communication affairs. At that time the financing of this venture was a risky problem, and the founders of the company were advised by government representatives to tie their communication system in with their manufacturing business, which in itself had then but meager prospects, in the hope of giving sufficient encouragement to the directors to finance the communication company. Had this not been done, there would today have been competition in radio receiver sales between the two leading electrical manufacturing companies, but it is extremely doubtful whether, had this latter decision been made, the American communication company would have got well underway. And if you will look back and try to put yourselves in the atmosphere of 1919, you will see that the importance of establishing a strong American communication company to compete against the British cables was of vastly greater importance than any disadvantage which could be foreseen in the radio trade field, as at that time there was no radiotelephone broadcasting. And you will possibly recollect that prior to taking the step which resulted in the formation of an American radio communication monopoly, the Secretary of the Navy had recommended government ownership, which was disapproved by Congress.

In the British Empire transportation and communications have long been realized to be the handmaids of commerce. The empire, and especially England, lives on overseas trade, which without adequate rapid world communications would be endangered. This country, due to its national prosperity, was slow to realize that at some later time, now rapidly approaching, we would have to compete with Europe in the world markets, and that international communications and commerce would become of great importance likewise to us.

Also, there is another reason which is perhaps even more far-reaching than that of pure commerce. The present age is one of democracy, and the principal method of controlling democracy is through newspapers. It was notable that at the imperial conference on communications the newspapers were well represented. London largely controls the news of the world and the medium of control is the communication net. With control of the public opinion of the world, business and commerce follow.

The American company had a hard struggle in the beginning. Some twenty millions were invested, and several years passed with only deficits. Circuits were not as efficient as anticipated, particularly to South America, and only pride, patriotism, and hope kept the company from becoming discouraged. But two things happened to save the situation: the advent of broadcasting with great profits; the short wave, with reduced costs, and reliable service.

One of the greatest responsibilities of the moment for privately owned commercial communications is to make a decision as to the future of the point-to-point communication services, particularly international and

feeder circuits for collection and distribution of traffic within the United States. This decision will have a direct bearing on preparedness for national defense in event of emergency.

The Navy has played a leading part in all that has been done for the nation's international communications. When it was the policy for the government to transmit commercial business, the Navy handled about $1,000,000 of paid traffic a year. With the gradual change in policy, the annual receipts have shrunk to about $100,000. This represents commercial and marine messages handled by stations in areas not served by commercial stations as well as transoceanic press to our insular and outlying possessions. This latter is handled over the transpacific circuit at the low rate of six cents a word with the privilege of a free drop off at Honolulu. The great Associated Press and United Press have, as a result, built up an American news service reaching all parts of the Orient. The Radio Corporation and commercial radio companies are directly benefited, inasmuch as their inter-Oriental circuits handle press and market reports from Manila to Oriental points.

The development of aids to aircraft and the handling of their communications has been most rapid. The Department of Commerce is charged with providing these services for the nation's airways. It has been the function of the Navy to provide for the requirements of its own aircraft, when these are not served by a regular airway, and to assist aircraft in general, wherever this does not duplicate the service rendered by the Department of Commerce. The furnishing of hydrographic information and general assistance to aircraft making an overseas trip is peculiarly a function of the Navy. During the past year many flights have been thus provided for. The plans made for the *Graf Zeppelin* were particularly complete and provided for weather and other information and radio compass bearings. This service is useful, and as a drill, is beneficial to the Navy. It is the policy to require that press and commercial traffic to and from aircraft be handled through commercial stations, wherever these are available. A considerable amount of research and development work is being done by the Navy in effecting improvements in aircraft radio apparatus and this has had a very great influence in the progress made in aircraft design.

The furnishing of hydrographic information and marine assistance in general is a historic function of the Navy. This comprises the broadcasting of weather and hydrographic warnings, together with time signals. The Naval Communication Service coöperated with the Naval Observatory in making radio observations during the eclipse of May 9, 1929, and a special radio party made a trip on the U.S.S. *Hulbert* to the Southern Philippines and took the signal strength upon various frequencies. Many other stations throughout the Asiatic Station took observations under partial eclipse conditions. Inasmuch as this was a total eclipse, remarkable for its duration and totality, these observations were of great scientific value. The Naval Communication Service facilities have also been made available for the forwarding of information relative to earthquakes to the great seismic observatory which is expected to be located at Manila.

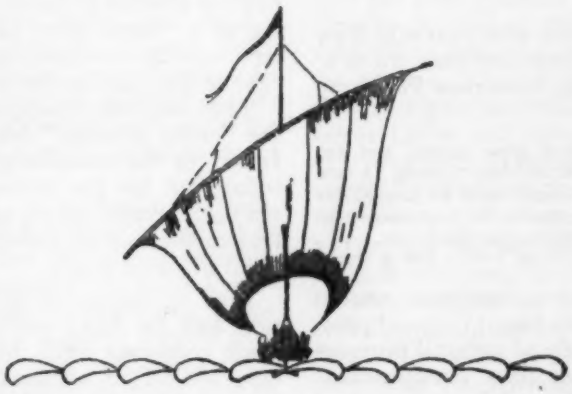
A very considerable progress has been made in increasing the reliability of radio communications during typhoons and disastrous storms. This is accomplished by the installation of emergency transmitters, the use of radio control, and the provision of emergency local control, together with the provision of spare antennas and apparatus. In a broader way, the facilities of the Volunteer Communication Reserve and an emergency organization add additional security and insurance against total interruption. These precautionary measures not only serve the Navy but they have a national value and importance which cannot be exaggerated.

The Navy has endeavored to keep abreast or ahead of progress in the radio art, and a far-sighted policy has been considered to warrant the installation of one or two units of each new piece of apparatus. At times this has been done when its practical utilization has seemed somewhat doubtful. In accordance with this policy, automatic high-speed transmitting and receiving apparatus is now being tested under service conditions. Facsimile reproduction and television will, no doubt, soon have their naval application, and it will, likewise, be necessary to exhibit "talkies" if the better motion picture talent is to be available to naval personnel. The Navy has also provided for a certain amount of pure research to conform to the

parallel investigations being conducted by other great organizations.

Practically all transpacific and other long-distance traffic is now handled upon high frequency. This insures greater dispatch of traffic with reduced power costs. However, the powerful low-frequency sets are being retained, for the present, for use for fleet work, and as a standby in case of magnetic disturbances.

In accomplishing the above, an effort has been made to obtain the greatest economy. Wherever naval facilities or stations have been no longer required in preparation for war, these have been closed, providing this was possible from commercial and other considerations. It has been possible to plan for the closing of two of the Great Lakes naval compass stations at the close of the present navigation season and two the following season. Cordova transmitting station will be closed this summer and all apparatus concentrated at the receiving station. By thus furthering the national policy of economy, the Navy gives proof of its broad national loyalty.



Naval Policy *and* Sea-borne Commerce

By CAPTAIN DUDLEY W. KNOX, *U. S. Navy (Retired)*

THE extraordinary growth of American foreign trade since 1922 is rapidly restoring maritime affairs to their normal place in our national life, and hence reviving our traditional "sea-mindedness." It is only the last two generations of Americans who have been engrossed almost exclusively with the extensive development of vast internal resources.

The seven generations before them looked to the sea as a primary means of domestic transportation and an indispensable agency of national business and prosperity. The connection which the sea gave to the outside world for the carriage of exportable surplus goods and of needful imports, was then, as it is once more, a cardinal factor in our national economics.

Of the economic crisis which came to New England in 1641 as a reflex of the Civil War in the mother country, Governor Winthrop wrote:

> All foreign commodities grew scarce, and our own of no price. Corn would buy nothing; a cow which cost last year £20 might now be bought for £4 or £5. . . . . These straits set our people on work to provide fish, clapboards, plank, etc. . . . . *and to look out to the West Indies for a trade.*

Henceforth, sea-borne commerce was to become the very foundation of Colonial prosperity, and subsequently of national prosperity. The hard times of 1641, notwithstanding a surplus production of food, furnished our first proof that overseas trade is essential to our prosperity. The same principle has been amply demonstrated several times since then, notably during the Jefferson Embargo of 1807, and is dwelt upon here because of recent propaganda against our having a Navy equal to the strongest on the ground that we are self-supporting in food and many other necessaries.

Interference with Colonial maritime commerce was a prime cause of the Revolutionary War, which was begun more to obtain commercial freedom than political independence. The outstanding importance of ocean trade to the national welfare again became evident under the Articles of Confederation. The inability of that feeble government to regulate, protect, and maintain our trade against foreign competition was a principal cause of the formulation and adoption of the Constitution.

The new government had been scarcely organized before President Washington recommended to Congress (December, 1790) respecting our Mediterranean trade: "So many circumstances unite in rendering the present state of it distressful to us, that you will not think any deliberations misplaced which may lead to its relief and protection." This led to the introduction of the first naval bill in January, 1794, for the building of a "naval force adequate to the protection of the commerce of the United States against the Algerine corsaire."

Thus was the American Navy born, not for "coast defense," nor for "national defense" in the commonly accepted sense of today, but for the protection of American sea-borne trade, which fundamentally is the true mission of all navies and the basic element of naval policy.

Bred by immutable economic law, the nation and its Navy continued to be highly trade conscious until the Civil War, when domestic affairs assumed an overshadowing importance, and were held so by subsequent internal development until the World War. Old naval records teem with references to sea-borne trade in its every aspect. The Navy then clearly recognized its basic mission. As for the attitude of the country at large we need only recall the facts that the Barbary Wars, the quasi war with France in 1798, the War of 1812, several large expeditions against West Indian pirates, and the quasi war with Paraguay in 1859-60, besides many lesser resorts to force, all had their origins in interference with American maritime commerce. In addition the government was con-

stantly employing the Navy to promote foreign trade. Perry's opening of Japan is but one example.

It took the World War to wake us from our lethargy respecting maritime affairs into which we had fallen during the Civil War. In 1914-15 foreign merchant ships upon which we had then come to depend almost exclusively for the carriage of our trade were withdrawn wholesale for war use by the Allies. There was virtually no American marine to replace them. So we learned again the old lesson which had been forcibly demonstrated for us in 1641, 1807, 1813-14, and 1900 (Boer War). Ability to produce a surplus of food and many other necessaries is no substitute for a foreign trade when it comes to ensuring the livelihood and even reasonable prosperity of many millions of our population.

The World War demonstration was peculiar in the variety of ways in which this lesson was rammed home. There was first the withdrawal of foreign shipping already mentioned. Then, as belligerent demands for goods rose to unparalleled heights and our commerce again flourished, we experienced from both sides in the great conflict that acute interference with our trade which one belligerent is always prone to adopt towards the neutral supplies destined for his enemy. Finally, even before we entered the war, our commerce was subjected to direct hostile attack.

The whole set of circumstances was sufficient to convince the American people, let us hope permanently, that the national interests from all angles emphatically require a merchant marine rationally proportioned to our sea-borne trade, and a Navy at least of such strength as will deter even hard-pressed belligerents from unwarranted interference with our legally conducted trade.

The state of mind of America at the close of the war went even beyond this. A President and cabinet, which as late as 1916 were more genuinely and frankly pacifistic than any before them, in 1919 were ardent supporters of the most collossal government merchant-marine and naval building program in history. Every American understood what foreigners were prone to disbelieve, that these were not evidences of militarism, but an expression of economic policy flowing from fundamental conditions.

Under the impulse of her genius for quantity production, backed with vast natural resources and superior racial characteristics, the United States had become a gigantic producer in almost every field of industry. On a greater scale our situation closely paralleled that of England in the youth of her "industrial revolution" which burst the bounds of insularity and irresistibly transformed her into the world leader of wealth and power.

For a superlative producer nation, and especially for one occupying an insular position, like the United States and Great Britain, merchant shipping and navy are the handmaidens of economic welfare. Since the war they have been an important influence in the great strides which have been made in our foreign commerce, and hence in our domestic prosperity. Unless all signs fail, these last ten years mark merely the beginning of an extraordinary era of development in which shipping, safeguarded by a navy, is to play a vital part.

Let us translate some of these generalities into a more concrete picture. The latest available official statistics (for the year 1927) give the total value of our ocean-borne foreign trade as 8.47 billion dollars, and the value of our ocean-going coastwise trade as six billions. The latter figure includes only strictly high-seas traffic, and excludes the Great Lakes and inland waterways; much of it traverses very long ocean voyages. Our aggregate deep-sea trade then amounts to 14.5 billion dollars every year.

That this is a large sum even for modern times is evidenced by the fact that the final German reparations settlement which has kept Europe in such a turmoil for the last decade amounted to about nine billion dollars. Our total national debt is now less than seventeen billions.

It is obvious what a vital element such a volume of maritime commerce must be in the national economic life. In his pre-election speech in Boston, on October 16, 1928, Mr. Hoover said:

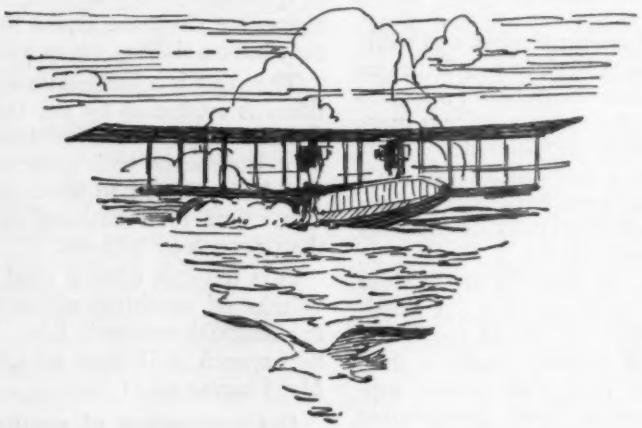
> Our total volume of exports translates itself into employment for 2,400,000 families, while its increase in the last seven years has interpreted itself into livelihood for 500,000 additional families in the United States. And in addition to this, millions more families find employment in the manufacture of imported raw materials. The farmer has a better market for his produce by reason of their employment.

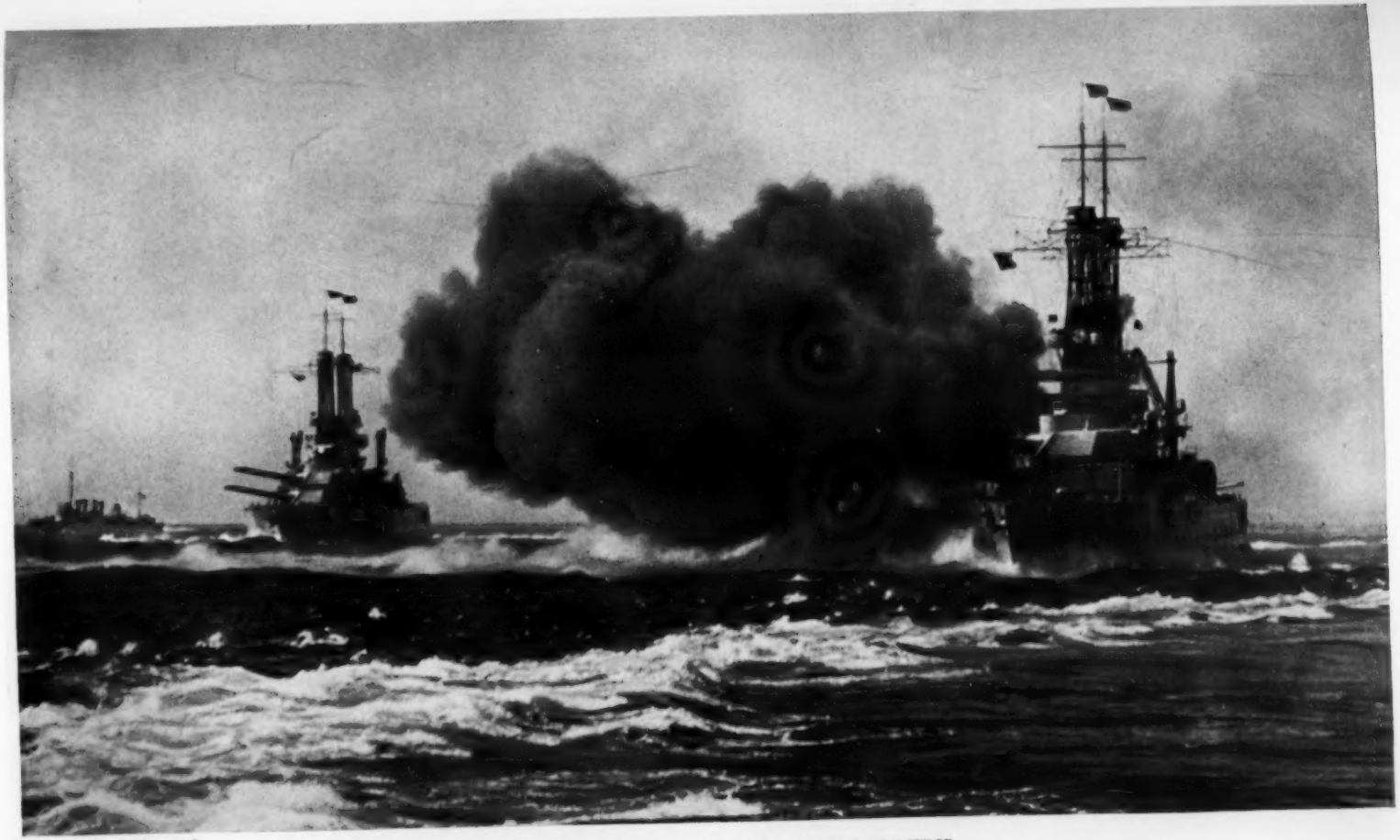
It is well to bear such statistics in mind in appraising the degree of the responsibility resting upon the Navy for the protection of such a sea-borne trade. They are the best answer to the constant criticism made in certain quarters regarding the financial burden of naval armaments. A few months ago the country seemed quite shocked at the statement of an American official that the naval ships projected by the United States during the next fifteen years would cost $1,170,000,000. Of course this is a large sum which should not be spent unnecessarily. But what it is supposed to be spent for should also be considered. Fifteen years from now, allowing for a 5 per cent annual increase, our sea-borne trade should be worth thirty billion dollars in that year alone. The aggregate of our trade carried between now and then on this basis will be 327.88 billions. This somehow makes 1.17 billions for ships to protect the trade seem rather moderate.

Since sound naval policies are necessarily derivatives of national maritime interests, it is but natural that today we have rejuvenated the old-time arguments in favor of a large merchant marine, and a strong Navy. The transitory apathy towards these great national assets has gone with the temporary conditions which created it. No more in 1929 than in 1860 do we place credence in the sophistry which would leave the sea transport of our goods in the hands of trade competitors and would relegate the mission of our Navy to merely coast defense.

Henceforth the greatest producer and economic unit which the world has known, situated at the world's maritime center, must inevitably link up domestic production, foreign sources of raw materials, overseas markets, merchant marine, and Navy. In coast defense, protection against invasion, safeguarding our overseas possessions, reënforcing our diplomacy, and supporting our general political policies, the Navy as always will continue to play an important rôle.

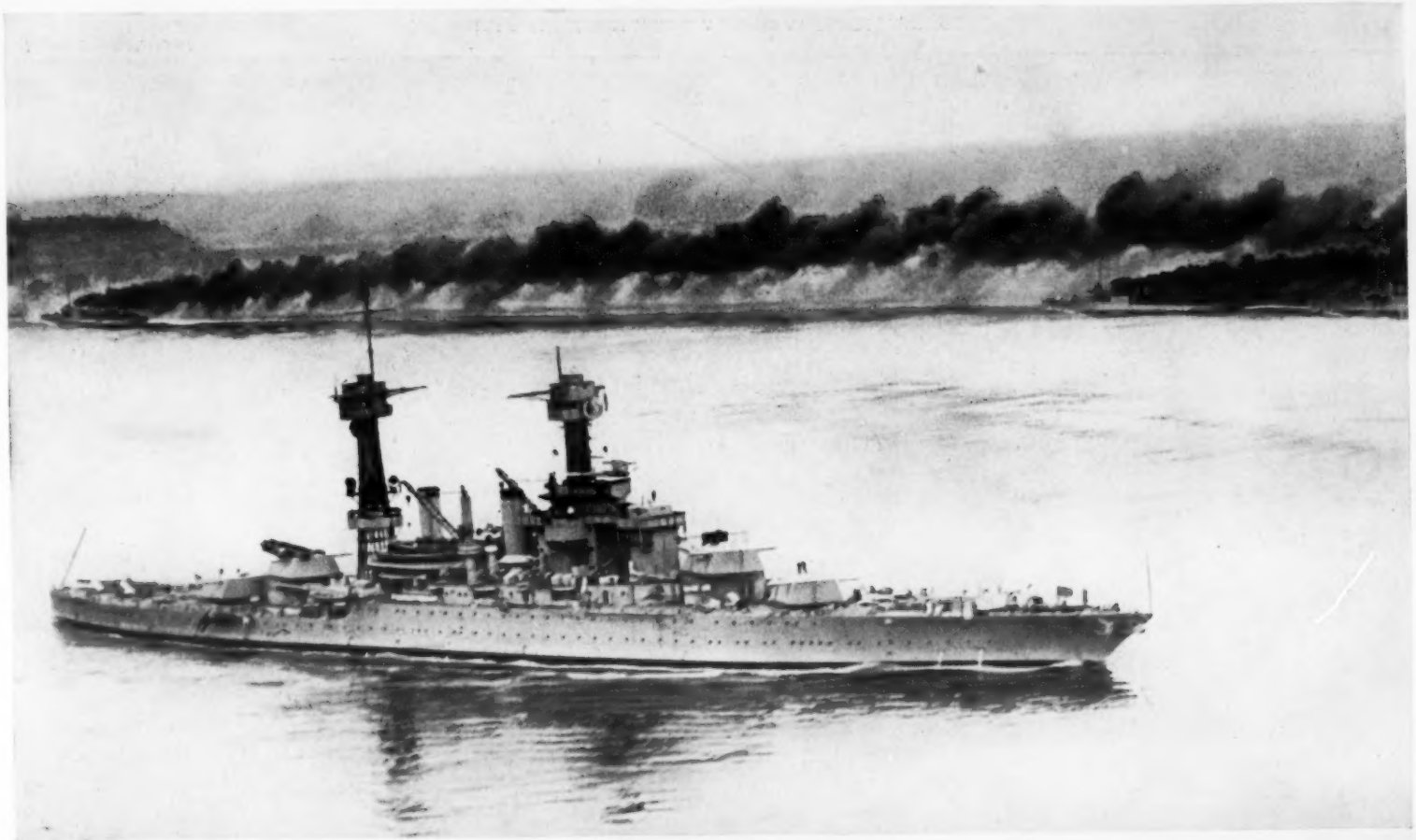
But in the largest perspective the Navy must more and more come to be recognized as an economic agency—as a basic factor in the country's business upon which the livelihood and prosperity of our citizenry depend.





International Newsreel

U.S.S. *MISSISSIPPI* FIRING A SALVO AT FORCE PRACTICE
U.S.S. *Idaho* is to the left, together with a destroyer of the screen.

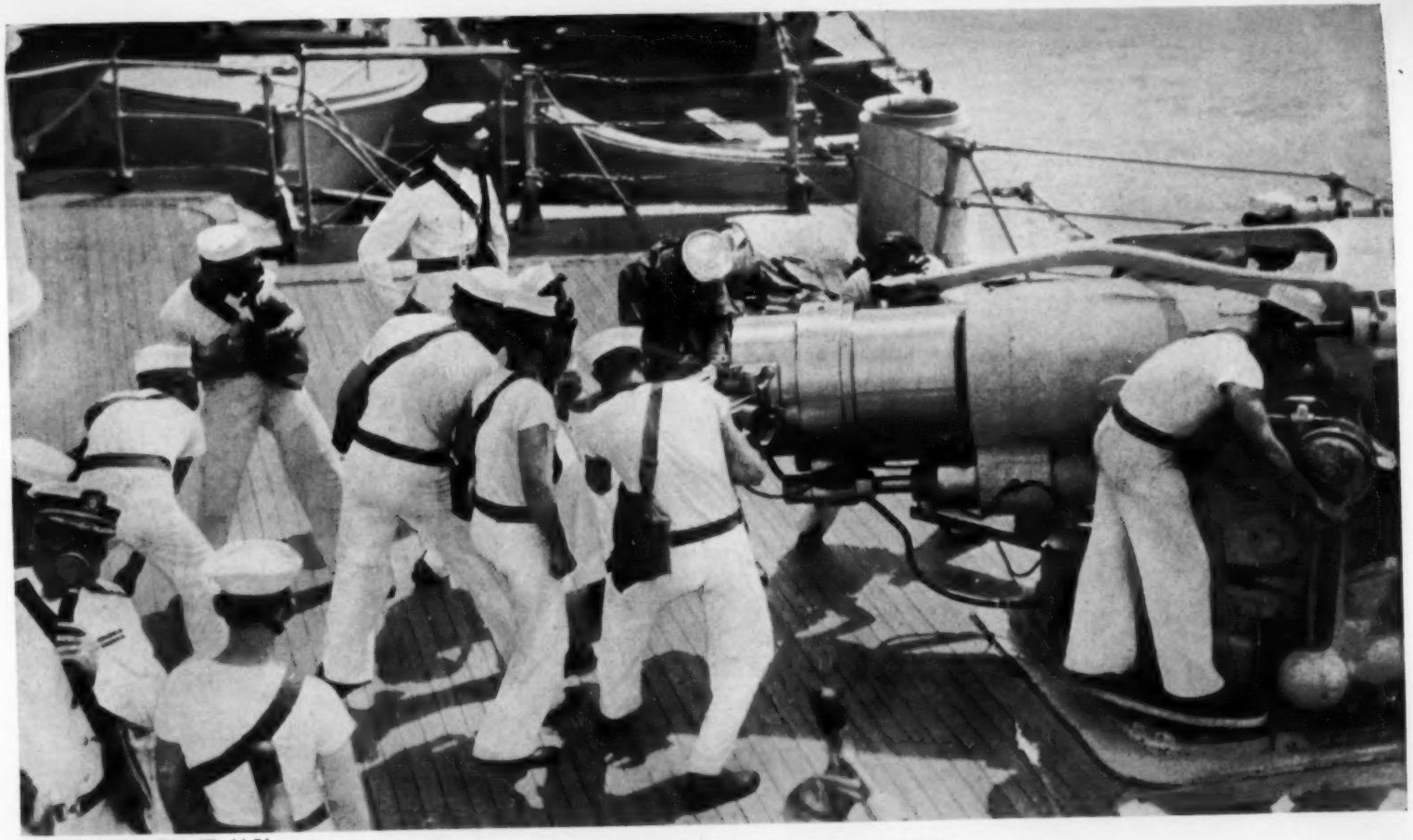


International News Photos, Inc.

TEAM WORK
Destroyers screen battleship from shore fortifications.

International News Photos, Inc.

TEAM WORK
Destroyers screen battleship from shore fortifications.



Photograph from Wide World Photos

GUN CREW AT DRILL, PROTECTED BY GAS MASKS

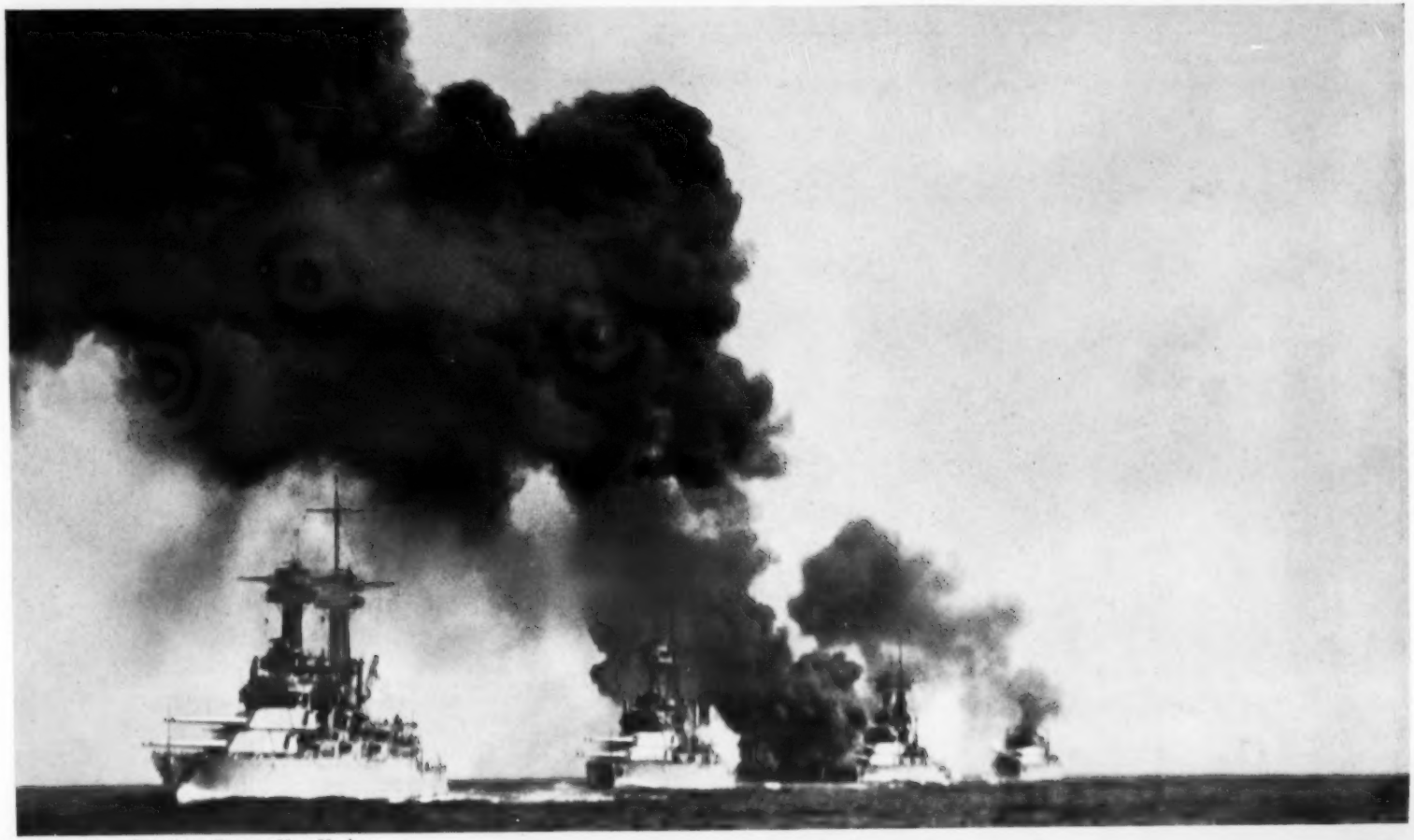
Courtesy Navy Recruiting Bureau, New York

DESTROYERS MANEUVERING AT HIGH SPEEDS

DESTROYERS MANEUVERING AT HIGH SPEEDS

Courtesy Office of Naval Intelligence, Navy Department

BLUEJACKETS MARCHING UP PENNSYLVANIA AVENUE, AT THE INAUGURATION OF PRESIDENT HOOVER

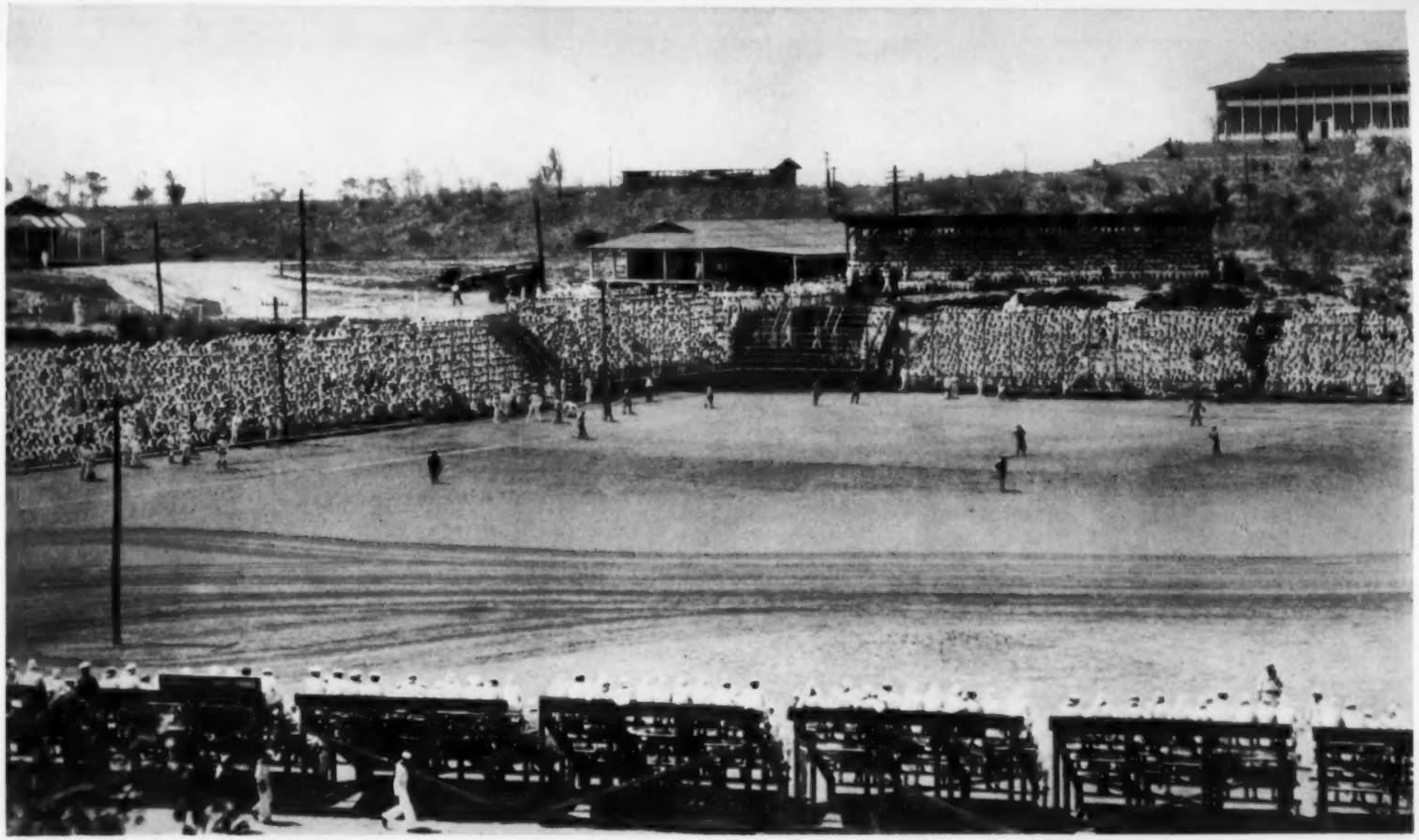


Courtesy Navy Recruiting Bureau, New York

DIVISION OF BATTLESHIPS AT FORCE BATTLE PRACTICE

Courtesy Navy Recruiting Bureau, New York

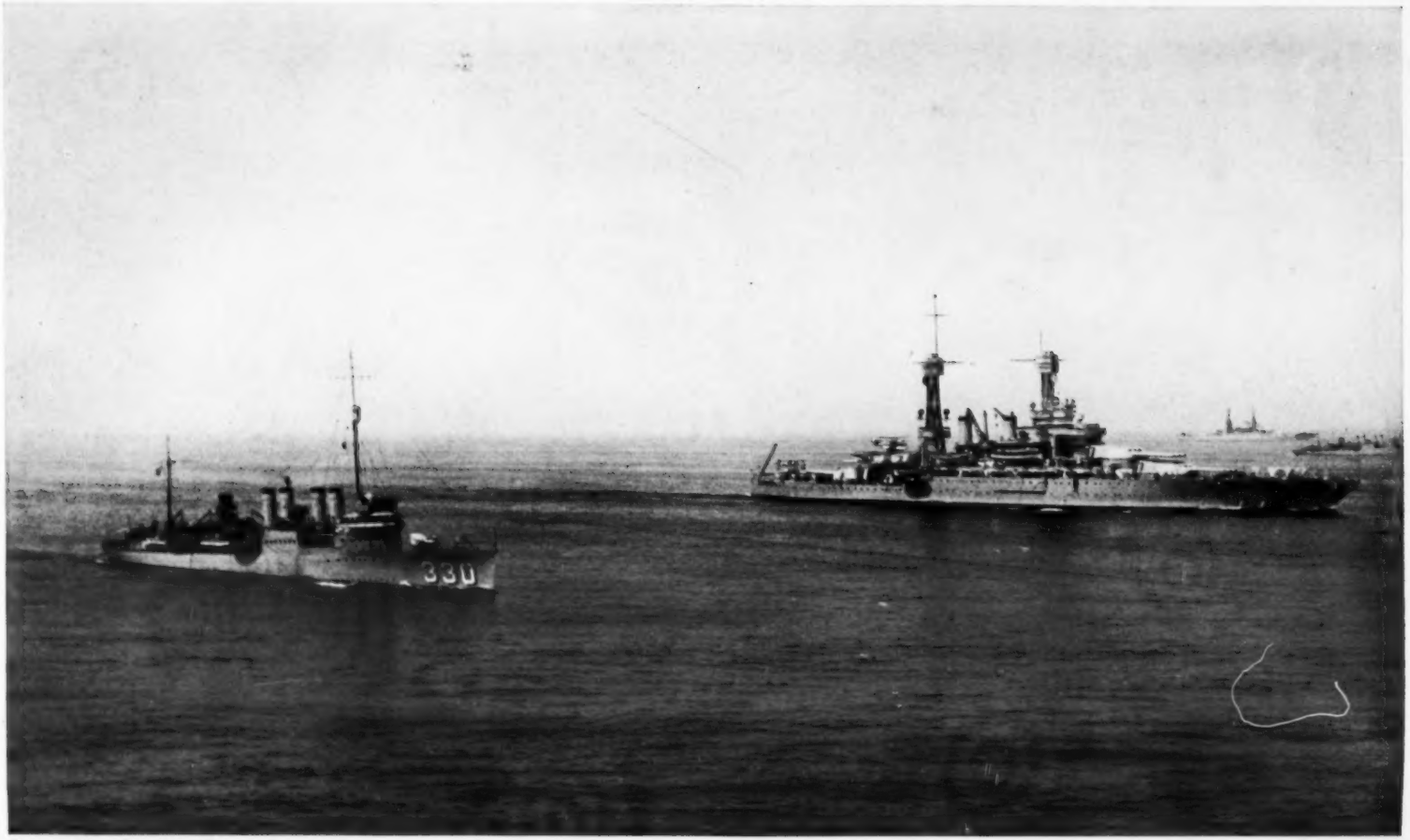
DIVISION OF BATTLESHIPS AT FORCE BATTLE PRACTICE



Courtesy Navy Recruiting Bureau, New York

RELIEVING THE TENSION

After a hard period of exercises, general relaxation is necessary. Baseball teams of the U.S.S. *Whitney* and U.S.S. *California* playing at Guantanamo Bay, Cuba.

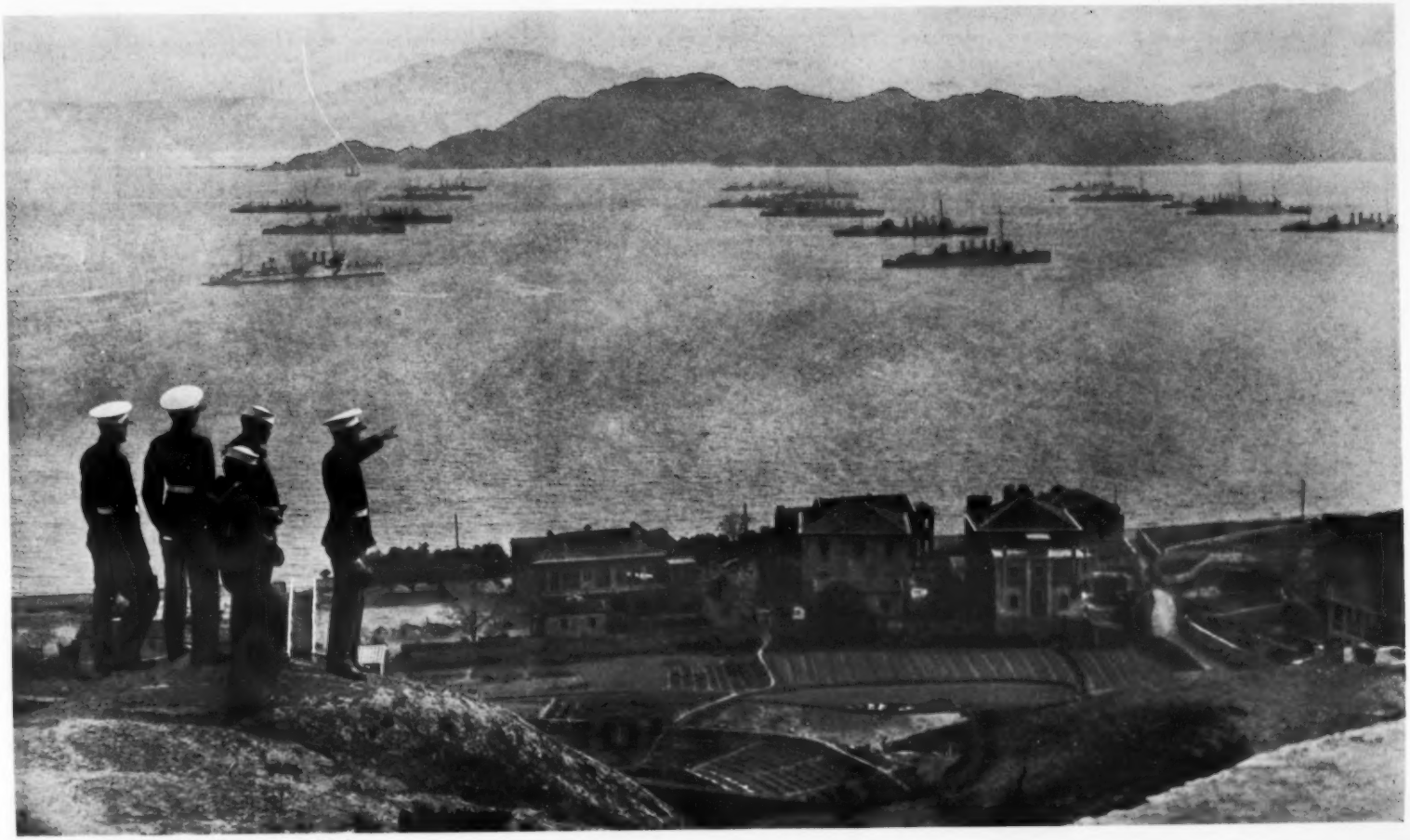


Courtesy Navy Recruiting Bureau, New York

BATTLESHIPS WITH THEIR SCREEN OF DESTROYERS

U. S. Navy Official Photo

SAILING RACES
During quiet spells in the fleet schedule.



Courtesy Navy Recruiting Bureau, New York

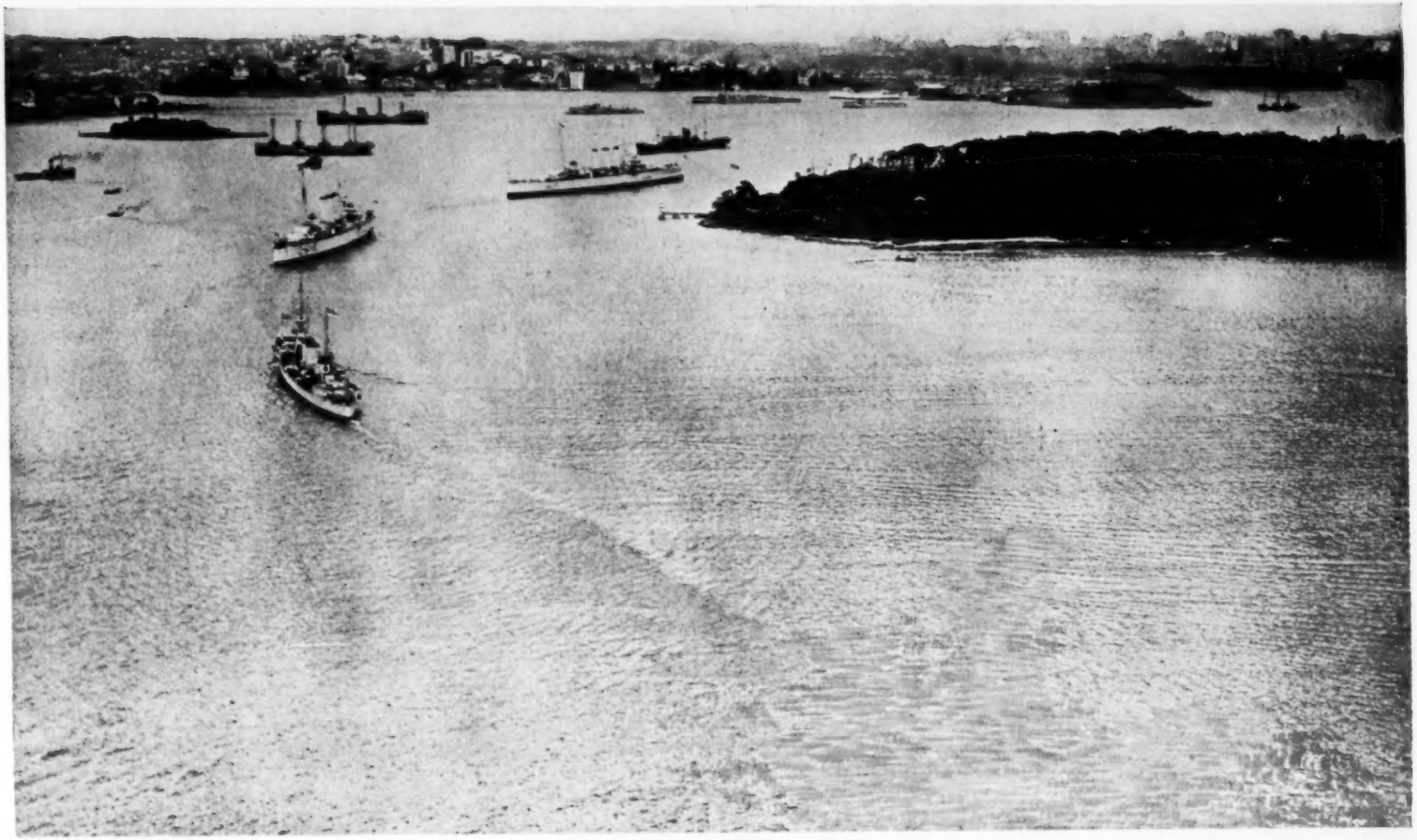
DESTROYER SQUADRON 15, OF THE ASIATIC FORCES
In the harbor of Amoy, China.

Courtesy Navy Recruiting Bureau, New York

DESTROYER SQUADRON 15, OF THE ASIATIC FORCES
In the harbor of Amoy, China.

Courtesy Navy Recruiting Bureau, New York

WITH THE SCOUTING FLEET IN CUBA
U.S.S. *Wyoming* (right), U.S.S. *Concord* (center), U.S.S. *Whitney* (left).



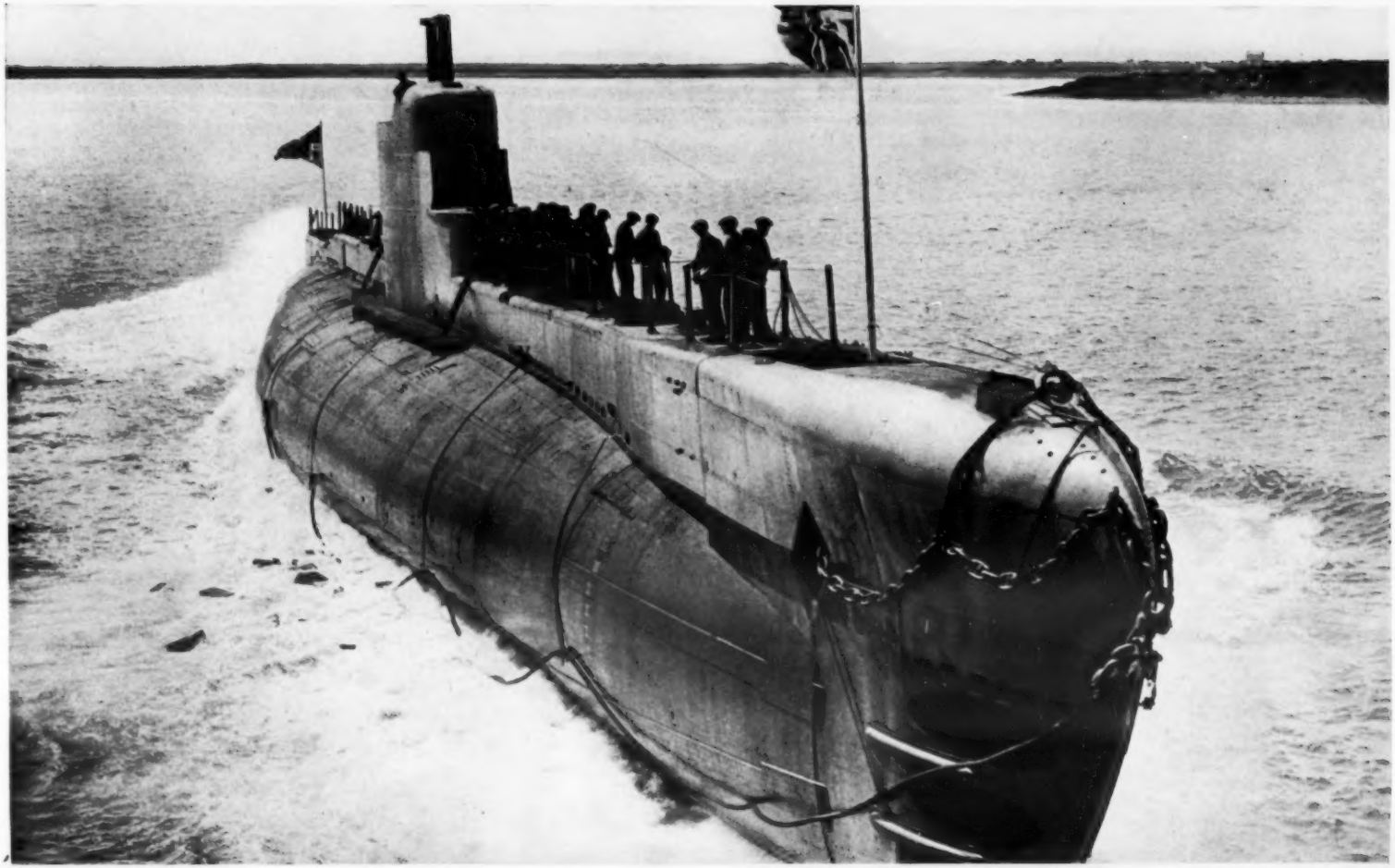
International News Photos, Inc.

AUSTRALIA HAS HER OWN NAVY
Ships of Australia and New Zealand keeping fit by maneuvers.

Ships of Australia and New Zealand keeping fit by maneuvers.

International News Photos, Inc.

THE AUSTRALIAN CARRIER *ALBATROSS*
Entering Sidney after maneuvers.



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GREAT BRITAIN'S NEWEST SUBMARINE, THE *PROTEUS*
Launched in July, 1929.

International News Photos, Inc.

GREAT BRITAIN'S NEWEST SUBMARINE, THE *PROTEUS*
Launched in July, 1929.

Courtesy Navy Recruiting Bureau, New York

MINOR TACTICS

Courtesy Navy Recruiting Bureau, New York

DESTROYERS AT ANCHOR IN MANILA BAY

Naval Personnel

By Rear Admiral R. H. Leigh, *U. S. Navy,*
Chief of Bureau of Navigation

NATIONS, after seasons of strife, find stimulus in reflection. Peace brings revision and reforms. The lessons learned are eagerly studied. Mistakes are acknowledged and there is ever present the resolution to profit in the future by giving heed to the experience of the past. When menaced by enemies, beset by hardships, welded together by love of country and loyalty to a cause, the people of a nation attain the highest state of discipline. A leader appears and they advance irresistibly to victory. The leader is, and never can be other than, the organized military branch of the government. But when there is no immediate need of its protection the people of a nation soon forget the wise maxim that "in peace we should prepare for war," and the military arm is forgotten. Peace disperses people to their normal pursuits. Every art, every science, every profession may have its genius, but neither individually nor collectively does it possess a leader. Individual entities composing a nation may struggle for existence and even be wiped out, though the nation itself may prosper. The absence of a common danger or a corporate necessity is destructive of discipline in its truest sense.

Discipline is the life blood of the Navy. There is no substitute. Without it, the hardships and privations of an unnatural existence could not be endured by its members. The young man entering the Naval Academy, realizing that he has forfeited family and home to the service of his country, takes his first breath of it. The boy who enlists in the ranks and finds that he has become a part of an organized body is brought face to face with it.

To the average mind, discipline is synonymous with punishment. The average individual thinks of infractions of numerous rules and regulations, and visualizes punishments and other corrective measures. Such mechanisms are but instruments for restoring order. They are the means for compelling obedience to the lessons experience teaches as essential to the life of a military body. They may have a bearing upon, but do not inculcate, discipline. Discipline has no relation to force. It is a reciprocal relationship between men of different stations which accomplishes the highest degree of efficient, spontaneous, and intelligent cooperation in all of the hardships and trials of service. Among seafaring men discipline attains true definition. Upon the trackless wastes, men must depend upon each other. The mode of life requires them to rise above self-interest, to understand the problems of their fellows, and to coöperate in the attainment of the mission of the whole.

An untrained, uneducated body of men may, for a time, be made submissive to strong will but eventually rebellion ensues. Train the body of men, educate it to reason and to understand, and it will coöperate willingly. Under efficient and sympathetic leadership, the highest state of discipline is reached. The mission of the Navy now, and at all times, is to attain that state of discipline which binds its members together and makes the thought of the common good rise above mere physical superiority.

The Act of March 27, 1794, "to provide a Naval Armament," marked the beginning of the Navy under the Constitution. Although some sort of a Navy was in being prior to this time, there existed no machinery with which to efficiently officer and man whatever vessels might be constructed. Ships authorized by the Act were presumably to be used to protect our commerce from the depredations of the Algerian corsairs. The Navy at this time being under the War Department, McHenry, the head of that department, set about to officer and man the frigates to be built. Barry, Nicholson, Talbot, Barney, Dale, and Truxtun were ap-

DESTROYERS AT ANCHOR IN MANILA BAY

Courtesy Navy Recruiting Bureau, New York

pointed captains. All had served with distinction in the Continental Navy.

On April 30, 1798, the Navy Department was created by Act of Congress, and Benjamin Stoddert became the first Secretary. There followed the first step toward proper organization. Training and discipline, however, did not enter into the general scheme. The absorbing function seemed to be that of procuring officers and men, somehow. Besides those officers who possessed the background of service and experience in the Continental Navy, many others had to be obtained. They came from all walks of life. Captains obtained commissions for their friends. Many were appointed at the solicitation of members of Congress and other officials prominent in the political life of the nation. It seemed to be of little consequence that junior officers possessed little or no seafaring or naval knowledge and experience, so long as the captain and his immediate assistants were able seamen.

The crew presented a problem too difficult for the Navy Department to solve. Procurement of men was left to the captains. Like the Canadian Mounted Police, they "got their men." How they went about it was of no apparent consequence. All that was asked or expected was that the ships be kept fully manned. Seemingly but one requirement was exacted: no man could be required to remain in the service after his enlistment had expired. This caused no hardship, however, for men could be discharged in whatever port a ship might be. As a result, many a citizen of foreign countries, innocently taking a constitutional along the waterfront at night, or indulging in a glass of beer with friendly American seamen, awoke the next day to find that he had become a member of the crew of an American man-of-war.

Throughout the strictly sail era of the Navy, knowledge was concentrated in a few. The captain was every inch a king. His cabin in the after part of the ship was his palace. None but orderlies and servants dared to violate the privacy of his quarters. Officers entered only by invitation, and usually in fear and trembling. He was the fire-control officer. He required no range finder or other instruments of precision. Extreme battle range was the distance at which the whites of the enemy's eyes might be discerned. The captain was an expert seaman. He knew how to perform all known evolutions under sail, and he had with him just enough officers of ability along those lines to satisfy all requirements—to make the ship and crew perform.

There were midshipmen aplenty. Like the mass of officers, they were appointed without thought of whether or not they were suited to the service. The Department appointed as many as could be accommodated on board ship. There was apparently no criterion upon which to base fitness. As a rule, the Secretary appointed those who had the strongest backing. The official importance of the sponsor of a boy was the only basis upon which to judge the character of the appointee. Even then many incorrigible youths who were beyond parental control found their way into the steerage mess through the influence of parents who hoped the rigid regulations and laws of the Navy might be their salvation.

Crews of ships were recruited everywhere and by every possible means. No records of recruiting were kept prior to 1824. Had records been kept, it is doubtful whether they would bear publication. In general, men were enlisted for particular ships. Seamen were always scarce although there was an abundance of ordinary seamen and boys. Until about 1812, one-sixth were foreigners. Backed by the iron will of the captain, the officers, aided by a handful of petty officers, were able to force obedience to every command. During the war with France there were only a dozen rates on the muster roll. Thirty years later the total number remained unchanged. In the meanwhile, however, the yeoman-of-the-gunroom had passed out, and in his place appeared the schoolmaster. During this time there was little improvement in the quality of enlisted men. They knew but little of the duties of a mariner. Rough and tumble fighting was to their liking and they relished not at all the business of manning the guns. Their backwardness, however, was overcome by the ever-present marines who forced them to "stick to their guns" when occasion required.

Judged by present-day standards, the methods of procurement of officers and recruitment of men during the sail era were extremely lax. Moreover, no attempt was made to afford officers the opportunity to prepare themselves for the dignified and responsible duties of command. It is true that schoolmasters were appointed to ships for

the purpose of instructing midshipmen in the rudiments of navigation and mathematics; little could be taught, however, on board ship, and the office of schoolmaster soon became a soft snap.

For many years, the Secretary of the Navy procured and assigned officers without regard to their fitness for the positions to which they were assigned. The actual orders involving assignment to duty were prepared by a clerk in the Secretary's office. In view of the state of affairs, it is not a matter of wonder that during the early years of the Navy, personnel was far from being content and happy.

The advent of steam wrought a great change. Management of the engineer department and operation of the heavy, cumbersome machinery were beyond the knowledge of the captain. Although efforts had, upon occasion, been made to interest Congress in the necessity of providing schools on shore, they were received with little sympathy and marked by no success. Now it was different. Captain Matthew C. Perry, a leader in the efforts to organize and establish suitable means for training officers and men, renewed his efforts in 1837 to obtain trained men for the Navy. His efforts were rewarded by the establishment of the rates of fireman and coal heaver. In 1842 the Engineer Corps was established.

When the value of steam machinery as a propelling agent became fully apparent, the difficulty of obtaining men trained in its operation was realized. The old system of recruiting men was inadequate to meet the needs, and the Navy possessed no facilities for developing technicians from mariners. During the preceding fifteen years, ratings had increased from about twelve to twice that number. Musicians appeared, marking an apparent effort to improve life on board ship. But there was little joy in the lives of the engineers. The need for them was accepted, but no provision was made for their comfort; they took what was left. Both officers and men of the engineer force spent most of their time on deck, when off duty, seeking shelter where they could find it.

In 1843, the whole number of officers and men numbered 10,843. A year later enlistment was suspended and many men had to be discharged, as Congress limited the enlisted strength to 7,500 men and boys. About this time the Secretary repeatedly recommended a reduction in the number of officers, and toyed with the idea of "selection out," finally giving it up in despair. Morale was low in consequence of such unsettled conditions. As evidence of complete lack of understanding, the Secretary in one breath proclaimed the love of seamen for the service, and in the next breath stated that violation of the law on shipboard had assumed serious proportions. His observations, however, took one serious and important trend. He decried the lack of proper educational facilities and urged the establishment of schools on shore. A year later he urged that a school be established at Fort Severn, Annapolis. The Secretary of War immediately transferred the fort to the Navy Department, and Commander Franklin Buchanan was ordered to organize the school.

The next fifteen years comprise the period leading up to the Civil War. During this time the Naval Academy became firmly established and graduated many officers who were destined to win fame and glory during the great conflict. No facilities were provided, however, for training men, other than seamen. Most of the rated men and all technicians were given their rates upon enlistment. Their only experience was gained on shore or on coasting and river steamers. Naturally the quality was not high. By this method many men were brought into the Navy who knew nothing of naval life and cared less for its good name. Discipline therefore showed no improvement among the 11,895 officers and men who constituted the average personnel strength during the year preceding hostilities. Corporal punishment had been abolished by Act of Congress but no provision was made for the punishment of minor offenses. Men soon realized that speedy punishment for their offenses disappeared with the lash and they soon became indifferent to authority. Morale of officers and men alike suffered from the chaotic conditions.

The first gun of the Civil War awoke the Navy from its state of lethargy. Ships were built as rapidly as possible. Many were purchased. Men were recruited without difficulty. Officers of more or less ability were obtained for general purposes, but engineers were scarce. The need was so great that almost anyone who could show a letter of recommendation from the chief engineer of a man-of-war, or from a prominent politi-

cian, was given an acting appointment as assistant engineer. Many had no practical knowledge of marine machinery. Men of education and ability along other lines, actuated by the desire to serve their country, were appointed to engineering positions on shore. One patriot, a village schoolmaster from a New England state, was appointed, although his application disclosed the fact that his engineering knowledge had been obtained from pictures of engines he had seen in a textbook. Another gained his engineering experience as captain of a tug boat. The Department was greatly concerned by the large number of machinery breakdowns, and in the hope of impressing upon chief engineers the importance of their tasks, issued a general order stating that "Engineers will hereafter understand that the condition of machinery under their charge on the arrival of a vessel from a cruise, will be considered as a test of their efficiency and fidelity in the discharge of their duties."

The Civil War demonstrated the necessity for still more men of special qualifications, capable of performing new duties, so that in 1866 there were fifty-three ratings carried on the muster roll. It was at this time that the subject of proper training of officers and men began to receive most serious consideration. The Naval Academy, which had retreated to Newport during the war, was reëstablished at Annapolis and expanded. The operations of the Navy contributed to the success of Federal arms by throttling commerce, and weakened the opposing armies by depriving them of arms and other supplies. We had become a naval power. To maintain our position it was apparent to all that the best talent in the country must be obtained for officers, and that adequate means for securing ability and experience must be provided. It was fully recognized that ours must be a disciplined Navy and the only method of accomplishment was through education and training.

During the period intervening between the Civil War and the conflict with Spain, new types of ships were constructed. Torpedoes and mines were developed into useful and practical weapons. The short-range guns were supplanted by high-power rifled cannon. Ericsson's turret came into its own. Machinery for propulsion improved in reliability and increased in power. These things further demonstrated the fact that men to man our vessels could not be recruited without regard to quality. Enlistment standards were accordingly raised. It soon became apparent that skilled artisans could no longer be obtained upon call. Accordingly schools were established. Ships for the sole purpose of training seamen were commissioned. Gunnery ships and gunnery schools were provided for the purpose of training officers as well as men. Comfort of officers and crew was considered in the design of new ships, and measures were taken to make life more agreeable for personnel, so that when the Secretary of the Navy reported that "Our sailors are held by affection and choice; they love the service," he sized up the situation correctly. They were in fact acquiring *esprit de corps*, an essential to discipline.

In 1862 the Bureau of Navigation was established, with supervision over the Naval Observatory, Hydrographic Office, Nautical Almanac Office, and the Naval Academy. Recruiting was assigned to the Bureau of Equipment and Recruiting. Detail of officers, which lends itself so readily to political and personal favor, remained in the office of the Secretary. The Civil War demonstrated the fact that, as a general rule, experience cannot be disregarded in the assignment of officers to duty. It is a partial gauge of ability. Accordingly, in 1865, detail of officers was entrusted to the bureau. Later it was charged that a small group of officers ruled in the matter of detail, so that favorites were given the most desirable commands. In order to remove all possible grounds for suspicion, the Secretary of the Navy in 1884 vested the power of assigning officers to a board of bureau chiefs. A year later detail of officers was restored to the bureau.

In 1889 recruiting was assigned to the Bureau of Navigation. Subsequent changes in the organization of the Navy Department ultimately placed all personnel matters under the Bureau of Navigation, so that by the time war with Spain was imminent, the bureau was equipped to handle the vast amount of work incident to providing officers and men for the augmented Navy prior to and during the war.

It is interesting to note how changes in types of ships, methods of propulsion, and armament have caused new ratings to be introduced in order to provide experienced men to supervise the tasks to be performed. In 1860 there were fifty-three ratings in the

Navy. Fifteen years later the number increased to fifty-seven. During the next fifteen years eight new ratings were added, making sixty-five in all. The number began to decrease, for at the close of 1897 there was a total of forty-nine. During that year the average enlisted strength was 8,685 men and 1,642 apprentices. As an index to the standards of requirements exacted in recruiting, 28,789 men and 3,595 apprentices applied for enlistment, but only 4,544 men and 701 apprentices were accepted. Of this number, 1,388 were men of continuous service. Recruiting of men for service in the Spanish War did not require a lowering of standards, as will be apparent, for during the year 1898, 82,324 men applied for enlistment and but 16,438 were accepted. During that year, of the non-rated men in general service, 66 per cent were native born, 77 per cent were citizens, and of the remainder, 42 per cent had declared their intentions of becoming citizens. The call to arms also necessitated many additional officers, and they were readily obtained. By October 1, 1898, 856 appointments for temporary service were made. Additional candidates to the number of 194 passed the required examinations but were not commissioned.

The first few years after the Spanish War ushered in a period of naval increase. Vessels of all types were rapidly laid down and constructed. This resulted in more officers and men being required. Many suggestions were made as to how an equitable basis might be established from which to figure the strength of officer personnel. Little more was done, however, than to increase the number of appointments to the Naval Academy. It was a help, but the results were not felt until four years later when the first enlarged class had graduated. Relief was obtained from Congress in the matter of enlisted personnel, however, for in 1908 a law was passed allowing a strength of 38,500. This caused a large influx of non-rated, inexperienced men. In addition, it was necessary to increase the number of petty officers to a great extent. Training became more and more important. It was, in fact, at this time that the era of training started in earnest. The attention of officers everywhere centered upon the task of improving methods of practice, drill, and instruction. So interested were they in the subject that officers freely criticized the methods in vogue, in the hope of finding something better.

Gunnery was the absorbing topic. Although our marksmanship during the Spanish War achieved results, the record was nothing of which to boast. The British had been making wonderful progress in gunnery since about 1895, and results attained by our service suffered greatly by comparison. Captain Percy Scott, R.N., the officer responsible for this marked progress in the British Navy, met and explained the British system of training to Lieutenant William S. Sims while the latter was on duty on the China Station in the opening years of this century. Lieutenant Sims carried his championship of improved methods of gunnery training directly to President Roosevelt, after failure to secure recognition from the Navy Department and the Secretary of the Navy. This bold stroke resulted in Lieutenant Sims becoming inspector of target practice for six and a half years, and the evolution of gunnery to present-day standards.

In the midst of the strenuous efforts to obtain trained men to perform the multiplicity of duties of the new and improved Navy, a new science appeared upon the field. It was aviation. Accepted at first as a novelty of questionable use to the Navy, it soon started serious minds to thinking of the future, and in 1910 it was of sufficient importance to be mentioned in the Secretary's report for the first time. A year later, aviation development and aviation training were placed under the Bureau of Navigation. During that year, three officers were placed in training and soon qualified as aviators. Late in 1916, on the eve of our participation in the World War, the Navy boasted of nine aviators. There were also sixteen students under training, and a new class of twenty-two students was in process of formation.

Training had progressed so rapidly that in 1917 it had reached a well-organized status, and the Navy was prepared for the intensive training that followed our entry into the war. By this time the requirements for ratings had been thoroughly sifted. During the interval since the termination of the Spanish War, many rates were established and many were cancelled, so that the sum total remaining in 1917 was exactly the same as in 1897, namely, forty-nine.

The training effort expended during the years 1916, 1917, and 1918 is evident from

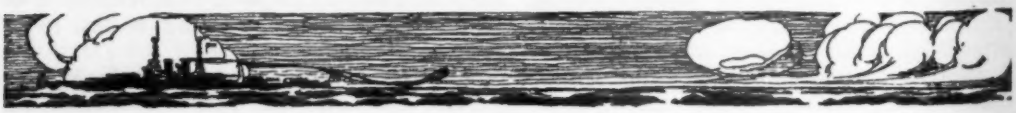
the vast increase in personnel. In June, 1916, there were actually in service 54,234 men. A year later the number had increased to 150,000 enlisted men, 48,000 reserves, and 15,000 Naval Militia and National Naval Volunteers. After eighteen months of war, there were over a half million men in the naval service. In the meanwhile, Congress passed an act authorizing a permanent enlisted force of 131,485 men and 6,000 apprentices. The matter of officer personnel was settled by designating the strength of the line as 4 per cent of the permanent enlisted strength. At that time the number was adequate, but in the years that followed, aviation expanded so rapidly, requiring such a large number of aviators to be recruited from officer personnel, that further expansion will soon become a matter of serious concern.

The years 1919 to 1921 wrought havoc to personnel of the Navy. Officers and men who entered the Navy to serve during the emergency went out by the thousand. Thousands of men were affected by the departure of shipmates and were not satisfied until they had been given special-order discharge. Officers, too, were caught in the current of unrest and hundreds resigned. The loss of experienced men made it necessary to redouble the training effort. Recruiting became difficult and men of lower educational qualities had to be accepted. This made the problem of training increasingly difficult.

The advent of new appliances on shipboard, and the rapid development and improvement of all of the many mechanisms that go to make up the modern fighting ship have placed increased burdens upon all officers. The bureau has endeavored to lighten this burden by expanding the scope of the postgraduate school and by offering other special courses of instruction, besides providing officers with the means for self-education. For the benefit of enlisted personnel, service schools have been greatly increased. Systematic training on board ship has been inaugurated and educational pamphlets are supplied by thousands. During the past three years, a total of fifty-eight different rating courses was printed and supplied; eighty-four general educational courses were also compiled and furnished in large quantities. No efforts are made to require personnel to study; it has not been found necessary. With the limited funds at its disposal, the bureau finds it increasingly difficult to prepare enough courses to meet the demand.

The Navy is a business and industrial institution as well as a fighting machine. It utilizes in some form or other the product of practically every industrial invention. It contributes as much to the welfare of the nation as industry contributes, and only through its existence is the nation's commerce able to survive. The modern man-of-war and its auxiliary, the naval airplane, are monuments to the skill and perseverance of the engineer. The efficiency of the Navy and the safety of the nation depend upon the accuracy and reliability of mechanisms, and the skill of those who operate them. The men who furnish the intelligence required to direct the operations of the fighting force must possess a technical background. Future success depends upon their vision, their constructive genius, and their administrative capabilities.

The modern seaman has discarded the marlinspike and the belaying pin and has become the master of tools and instruments of precision. There is no form of labor on board the man-of-war that is not in some degree skilled. The duties of officers and the demands upon their professional resources involve problems of design, construction, administration, and operation. The many and diverse responsibilities of captains and admirals require the exercise of skill, patience, tact, and education. In order to maintain the Navy as an efficient machine, the best talent of the country must be found among the officers and men who conduct the operations, and make the sacrifice to service. Welded together by thorough sympathy and mutual understanding, they attain that reciprocal relationship which stood out preëminently on board the sloop-of-war *Oneida* in 1870, when rammed and sinking, without sufficient boats to save the crew, officers and men calmly placed the sick in the few boats available for their salvation, then coolly went to their stations to meet death.



Uncle Sam *the* Pilot *for* American Shipping

By ALFRED H. HAAG, *Director, Department of International Shipping, Georgetown University, School of Foreign Service*

DURING the fiscal year 1928, 1,600 American and foreign ports participated in the foreign trade of the United States in which 5,100 vessels of 23,000,000 gross tons flying the flags of 28 countries transported 1,750,000 passengers and 100,000,000 tons of cargo valued at nearly $8,000,000,000.

The combined passenger and freight revenues approximated one billion dollars.

The percentage of cargo carried by American ships was one-third of the total in value and 40 per cent in volume. Twenty-eight per cent of the passengers were transported in American ships.

United States vessels of 100 gross tons and over taking part in our foreign trade during 1928 numbered 1,811 of 7,462,000 gross tons, consisting of 135 combination passenger and freight carriers, 1,001 general cargo vessels, 270 tankers, 1 refrigerator, 155 sailing ships and 249 barges.

British vessels numbered 1,734 of 8,000,000 gross tons and included 129 combination passenger and freight carriers, 1,145 general cargo ships, 209 tankers, 33 refrigerators, 101 sailing vessels and 117 barges. British vessels handled 30 per cent of the tonnage volume of our 1928 water-borne foreign commerce.

Other foreign flag vessels employed in the transportation of the 1928 foreign commerce of the United States included 399 Norwegian ships of 1,460,000 gross tons which carried 8 per cent of the total trade; 199 Japanese vessels of 1,240,000 tons which carried 4 per cent; 161 Italian ships of 1,000,000 gross tons carried 2.5 per cent; 150 German ships of 890,000 gross tons carried 2.75 per cent; 127 Dutch vessels of 677,000 gross tons carried 2.75 per cent of the foreign trade; 122 Danish ships of 431,000 gross tons carried 2.5 per cent; 104 Swedish vessels of 418,000 gross tons carried 2.25 per cent; and 90 French ships of 623,000 gross tons carried 2 per cent of the total cargo tonnage moved in the water-borne foreign trade of the United States in 1928.

Ships of eighteen other nations participating in the 1928 water-borne foreign trade of the United States numbered 200 of 785,000 gross tons. The cargo tonnage handled by these 200 vessels aggregated less than 4 per cent of the total traffic. The nationalities represented by these vessels included: Spain, Honduras, Belgium, Greece, Panama, Brazil, Danzig, Mexico, Nicaragua, Portugal, Venezuela, Chile, Peru, Finland, Cuba, Russia, Colombia, and Argentina.

Bulk commodities comprising petroleum, grain, sugar, coal, lumber, ores, and fertilizers constituted 73 per cent of the total trade. The bulk traffic in tankers was nearly 29 per cent of the total trade.

The total tonnage carried by vessels other than tankers was approximately 72,000,000 tons, of which 44,000,000 tons was composed of dry bulk commodities.

Of the total 40,000,000 tons carried by American flag ships, 30,000,000 tons, or 75 per cent, was made up of bulk commodities.

Of the total 60,000,000 tons carried by foreign flag ships 42,000,000 tons, or 71 per cent, was made up of bulk commodities.

In the fiscal year 1928, approximately 70 per cent of the entire water-borne commerce of the United States was carried in direct trade, the remaining 30 per cent being carried by foreign vessels plying between the United States and foreign ports not located in their own countries on what is termed indirect trade.

Comparing the carriage of American foreign trade in American ships during the dec-

ade ended 1914 with that of the past decade the figures disclose a marked increase in the percentage and value of cargo carried in American ships.

In the decade ending 1914, the average carried in American ships was slightly more than 10 per cent of the total value of our foreign trade, while in the decade ending June 30, 1929, it averaged better than 36 per cent. In view of the fact that the value of our total water-borne foreign trade in the decade just concluded has been more than double that of the decade ending with 1914, it is significant that the 26 per cent gain in the percentage of our foreign trade carried in American ships involved an advance from an annual average of $300,000,000 during the decade 1905-1914 to an annual average of $2,600,000,000 in the decade 1920-1929, an increase of more than 700 per cent in the value of our commerce carried in American ships.

Of particular interest is the growth of American flag services since 1914, when the total ocean-going American merchant marine employed in foreign and non-contiguous services consisted of fifteen foreign services and five non-contiguous services operating a total of 112 vessels of less than 600,000 gross tons.

At the present time the ocean-going American merchant fleet employed in established lines in foreign and non-contiguous trades consists of 671 vessels of over 3,865,000 gross tons. This shows a 500 per cent increase in numbers and nearly 550 per cent in tonnage since 1914. With few exceptions these vessels are of 2,000 gross tons and over and 60 per cent of the number and 65 per cent of the gross tonnage are now under private ownership.

During the height of government activities in the shipping business the United States Shipping Board had under its jurisdiction in vessels contracted for, requisitioned, commandeered, seized, transferred, chartered and purchased, 4,500 ships of over 17,500,000 gross tons.

This enormous tonnage has been reduced to the present total of less than 3,280,000 tons, comprising 595 ships still remaining under control of the United States Shipping Board, of which 229 vessels of 1,335,000 tons are in active service.

The figures disclose that material progress has been made in the past ten years and that Uncle Sam has proved himself a competent pilot in assisting American shipping to regain its position on the seas.

In the midsummer of 1914, the sea tonnage of the sixteen principal mercantile nations totaled 8,445 ships of 35,145,000 gross tons. At the peak of the participation of the United States Government in the shipping business it had under its jurisdiction more than half in both numbers and tons of the entire seagoing tonnage as recorded in 1914.

This shows how deeply submerged Uncle Sam was in the shipping business and the tremendous and complicated task confronting him.

In carrying out the provisions of the Merchant Marine Act of 1920, which authorized the United States Shipping Board to establish services in essential trade routes to all parts of the world, it is well to remember that we were in competition with maritime nations having the knowledge and mechanism of a successful background of maritime services, and during the period of reëstablishing ourselves on the seas the nations with whom we were competing had an additional advantage of modern seagoing ships at their disposal, of which 10,000,000 gross tons were constructed during the years 1922-1928.

That our pilot should succeed to the extent he did under the circumstances is a tribute to the American shipowner and operator and our exporters and importers and well illustrates the American trait that we can and do succeed when we apply ourselves to the job. He kept to his charted course and the people came to think of the object and purpose he had in mind; they then gave it their approval. This approval was ratified in the national legislation that has done so much to place the American flag back on the seven seas.

American shipping is advancing into ever safer waters and Uncle Sam is gradually turning over control to private interests.

The pilot has not yet completed his job but he has built the ways and laid the keel for American building of modern tonnage that soon will fulfill the edict that the United States shall have a merchant marine of the best equipped and most suitable types of vessels to carry at least 50 per cent of its commerce in its own ships, ultimately to be owned and operated privately by citizens of the United States.

The U. S. Marine Corps

By MAJOR GENERAL COMMANDANT W. C. NEVILLE, *U. S. Marine Corps*

THE United States Marine Corps is an arm of the naval service. It provides the Navy with a force, primarily trained as soldiers, for duty ashore in connection with the operations of the fleet; but its men must also possess certain seagoing qualities which will enable them to serve efficiently as part of the regular complement of the larger naval ships. To carry out the peculiar mission of their corps, both officers and men must be versatile in the extreme.

This versatility can best be illustrated by a simple statement of the distribution of troops. The total strength of the corps is approximately 18,000. Of this number 2,000 are on duty aboard ships of the Navy; 6,000 are serving ashore outside the continental limits of the United States in the West Indies, Nicaragua, Panama, Hawaii, Guam, China, and the Philippines; 1,000 are attached to the Marine Corps air squadrons; and the remainder are at home stations. All recruits are undergoing military training at the recruit depots in Parris Island, South Carolina, and San Diego, California. Men who have been designated for duty aboard naval vessels are attending the Sea School at Norfolk, Virginia, and San Diego, California, where they are pursuing courses in ship's routine, the handling of small boats, and the elements of naval gunnery.

Marine officers are attending a wide variety of schools. All second lieutenants, even those who have graduated from the Naval Academy or distinguished military colleges, must attend the Basic School at Philadelphia. There they receive practical instruction which prepares them for command in the field or service at sea. The value of this early education was recently demonstrated in Nicaragua, where young officers, just out of the Basic School, successfully led their men in minor warfare of the most trying nature. At the Marine Corps Schools in Quantico, Virginia, other officers are pursuing the company and field-officers' courses. Thus within a few years it is hoped that every marine officer below the grade of major will be thoroughly trained to fill the duties of the rank next above his own. Ranking marine officers are attending both the Army and Navy War Colleges and the Army Command and General Staff Schools. Officers of lower rank are among the students in the Infantry School of the Army. The Marine Corps maintains two regiments of artillery, and officers are sent to the Army Artillery Schools so that they may keep us in touch with the latest developments in this important branch of military science. One officer is attending the Cavalry School. In the past it has frequently been necessary to employ mounted marines during operations in such countries as Haiti and Nicaragua, and the Marine Corps must have a few officers to instruct others in the elements of cavalry tactics. For a number of years the Marine Corps has sent officers to the Motor Transport School, developing a highly valuable group of specialists for duty as instructors in our own schools and as staff officers in the field. Our graduates of the Signal Corps School have brought back to us vital information on the subject of communications. The Subsistence School and the Army Industrial College have taught our officers the fine points of the service of supply; and our aviators now attend both the Army and Navy flight schools. Several marine officers are pursuing language courses in China and Japan, and one officer is a student at L'Ecole Supèrieure de Guerre in France.

The versatility of the enlisted marine was thoroughly tested during the national elections in Nicaragua last fall. The events which led to the landing of marines in that country and the holding of elections under American supervision have been so well aired in the press that I shall not go over them here. However, while much space has been devoted to the more dramatic phases of the Nicaraguan campaign, the tasks performed

by our men in connection with the elections have attracted little public attention. They involved nothing more theatrical than hard work, but marked a great advance by Nicaragua toward peace and prosperity.

The first step toward the holding of the Nicaraguan elections was the appointment of Brigadier General Frank R. McCoy, U. S. Army, as special representative of the United States Government in Nicaragua for the purpose of supervising the elections. General McCoy brought with him several assistants, but the bulk of the personnel for more than four hundred polling places had to be provided by the Second Brigade of Marines. This force was augmented by 117 officers and bluejackets who were taken from ships of the Battle Fleet specially for election duty. Rival political parties, who but a short time before had been engaged in the disastrous civil war, agreed that our men could be trusted to administer the details of the election with disinterested honesty. During the summer preceding the elections schools were established in several of the larger cities where our men were given an intensive course in Spanish and the Nicaraguan election laws. This special training was necessary because few marines had ever taken part in such activities. In fact, the last election which marines supervised was held in Haiti many years before, and there were few officers and men in the brigade who even remembered it.

It is worthy of note that in many isolated villages young non-commissioned officers and privates successfully carried out the duties of directors of elections, tellers, and poll guards without any immediate supervision by commissioned officers. It was a supreme test of discipline and loyalty. So well was the work done that even the leaders of the losing party had nothing but praise for the marines.

Since the elections there has been a marked improvement in conditions in Nicaragua. Only a few scattered bands of outlaws remain, and they are no longer a serious menace to the existing government. Our forces have been able to isolate the territory in which they are operating in much the same manner that the sanitary authorities cut off an area where disease is epidemic. The region where outlaws are to be found is almost inaccessible, but our patrols, aided by Marine Corps air squadrons, have prevented any formidable concentration of those still at large. In this difficult task the air squadrons have been of inestimable value. Reconnaissance from the air has greatly reduced the danger of ambushes, and the planes have kept commanding officers in constant touch with their widely separated detachments. Many outposts have been completely supplied by the fliers. Important troop movements have been carried out by transport planes. Seriously wounded men have been rushed to the base hospital by air. It is safe to say that many of these men would have died had they been obliged to endure a long journey over rough trails before receiving surgical attention. Such perfect coöperation from the air has had a distinct effect on the morale of the ground troops. They now have the utmost confidence in the ability of the aviators to give them adequate support. They have developed a new technique by putting into practice many theories involving liaison between ground and air forces which, prior to the Nicaraguan campaign, had never been tested under actual field conditions.

The gradual withdrawal of marines from Nicaragua is now under way, but we cannot completely evacuate the country without leaving behind us some force to maintain the reign of law and order. For this purpose the Guardia Nacional has been organized. Its enlisted personnel is exclusively native, but the commissioned grades are now occupied by officers and non-commissioned officers of the Marine Corps. The commanding officer of this force is a colonel of the marines. The Guardia has already demonstrated its courage and loyalty. Its men have seen hard service alongside our own, and a feeling of mutual respect has grown up between them. Eventually educated Nicaraguans will be trained to command their own troops. Thus, when we leave, the people of Nicaragua will have some assurance that the pacification of their country will endure.

The organization of the Guardia Nacional in Nicaragua was no mere experiment. In two other Latin republics the Marine Corps has built up similar native forces. Before the marines evacuated Santo Domingo a Guardia Nacional was trained to carry on the work. This force is now entirely in the hands of Dominican officers and for several years has kept the country at peace without foreign assistance. In the early days of the formation of this force our officers had great

difficulty in inducing educated Dominicans to accept commissions in the Guardia. We tried to make them believe that we wished only to build up the Guardia so that we might leave the country at the earliest possible time. It was only after years of patient effort that their coöperation was secured. Today Dominican officers wear the same type of sword as our own in honor of the marines who trained them in the profession of arms, and marine officers who have visited the republic report that they were treated as honored guests.

In Haiti our problems have been solved in much the same manner. The Garde d'Haiti now exercises all the functions of army and police force. All marines have been withdrawn from the interior, leaving only two small garrisons at Port au Prince and Cape Haitien. In developing a corps of native officers we had to face the same feeling of distrust which was encountered in Santo Domingo. But we have finally managed to impress them with out sincerity, and today a large number of educated Haitians are serving as officers of their own national guard. The higher ranks are still occupied by marine officers and enlisted men, but several Haitians have advanced to the grade of captain. A military school has been established under the command of a marine officer, but most of the instructors are Haitians who have shown unusual ability. The formation of the native garde and the gradual reduction of the American forces have led the great majority of Haitians to believe our oft-repeated statement that we wish to remain in their country only long enough to develop a force that can maintain internal peace and national security.

Aside from the regiment now stationed in Nicaragua, the largest force of marines on foreign soil is serving in China. During the revolutionary disorders which preceded the formation of a strong national government, it was necessary to keep a brigade in the country. As conditions have become stabilized this force has been reduced, until now we have one regiment in Shanghai and the regular legation guard at Peking. While China was torn by internal strife, many delicate situations developed, but there were no real hostilities between our troops and the Chinese. The tact and forbearance displayed by officers and men won the respect of the people and enabled our government to avoid unpleasant incidents. Before the marines left Tientsin they rebuilt a fallen Chinese bridge which was presented to the people of the city as a monument to good will.

The permanent military forces of the United States are maintained through voluntary enlistment. In our efforts to induce the right type of young Americans to enter the service we must compete with those who are able to hold out promising opportunities in civil life. Therefore we must have something worth while to offer them. Once they are in the service we must induce as many as possible to remain and make it their life work, for a reënlisted man is obviously more valuable than a recruit. A discontented man, or an ambitious man who sees nothing ahead, does not reënlist. Pay, living conditions, and opportunities for advancements have a direct relation to efficiency and morale. Consequently every effort is made to feed men well, house them comfortably, and reward them for faithful service.

In the field and on foreign duty the marine realizes that he must endure certain hardships, but when he returns home he has a right to expect some of the comforts and conveniences enjoyed by his civilian friends. There has been a great improvement in housing conditions in the Marine Corps within the last few years. However, until recently the men stationed at our largest home post, Quantico, Virginia, were living in old, wartime barracks which their builders never intended to stand for more than a few years. Within the last few months three modern, permanent barracks have been completed at Quantico together with a central heating plant. Half of the personnel of the post are now comfortably quartered, and as funds become available the rest will live under the best possible conditions.

However, three meals and a good place to sleep are not sufficient inducements to keep the right type of men in the service. The pay of both officers and men has not kept pace with the rising cost of living, and steps are now being taken toward relieving this condition by means of legislation. The passage of a law which will assure to officers a steady flow of promotion is also being sought, in order that we may retain the services of men of ability who are constantly tempted by opportunities to reënter civil life.

The ambitious man in the ranks is always

a problem to his officers. He must never be allowed to feel that he cannot progress, that the service offers no opportunity for advancement. The establishment of the warrant grade has helped to maintain the morale of the older non-commissioned officers by holding out to them an opportunity to reach the pay and allowances of a junior officer. The younger marines can no longer say that they are prevented in any way from advancing to the highest rank. Every year a group of the most promising young enlisted men are sent to the Candidates' School where they are prepared to take the examination for a commission. Others may take courses leading to an appointment to the Naval Academy. Only a comparatively small number can hope to make the grade, but after all how many men who start at the bottom of the business ladder ever land in an executive position? Men who do not intend to remain in the service after their current enlistment are encouraged to prepare themselves for success in civil life. A free correspondence school is maintained for this class and for all others who wish to fill whatever gaps may exist in their early education. Many men now leave the Marine Corps with the equivalent of a high-school education or better. These men always retain their loyalty to the corps. Any number of them have won success in business. The Marine Corps is their "alma mater" where they learned lessons of discipline and thoroughness which enabled them to meet the competition of the outside world.

Aviation *in the* Fleet

By Rear Admiral J. M. Reeves, *U. S. Navy*
Recently Commander, Aircraft Squadrons, Battle Fleet

FORMERLY a civilian community awaited the arrival of the stagecoach or post rider for news and information. In the old days a naval commander sent a man aloft to the masthead to furnish him with news and information of the enemy. Modern inventions have changed all this. A civilian community now receives its news and information of the world at large by means of railway and airplane mail and by telegraph, telephone, and radio. A sea commander now sends a man aloft not to the masthead but in an airplane which scouts for hundreds of miles surrounding his position and furnishes him by radio news and information of the enemy. Modern inventions have materially changed the mode of life of civilian communities and they have equally changed the mode of conducting naval warfare.

Naval officers were quick to recognize in the airplane a new implement and a new weapon of naval warfare. Naval history contains numerous instances of the invention of new weapons of war which have been promptly developed and adapted to naval use. Each new weapon invented has had overenthusiastic partisans who exaggerated its capabilities and who prophesied that it would supersede or render obsolete existing weapons and naval vessels. History shows that these enthusiastic prophecies have never been fulfilled but that each new weapon, if proved effective, has remained merely to add its destructive power to those weapons and vessels already in existence. It is with this fact in mind that naval officers have promptly accepted the invention of the airplane and have turned their attention to a study of how it can be most effectively used in the conduct of naval warfare.

Airplanes in the fleet operate under several inherent handicaps and disadvantages which do not exist in the operation of aircraft from land bases. The planes must take off from the carrier's deck or catapult from the battleships and cruisers; they must operate over the ocean where the only landing fields are the decks of the carrier, or in the case of the seaplanes the ocean itself. The technique and skill required on the part of naval aviators in overcoming the initial difficulties automatically results in a high state of efficiency in the performance of their military missions in the air.

It is only after nine months of training and over three hundred hours of flying at the naval flying school at Pensacola that young naval officers receive their designation as naval aviators. As compared with the usual requirements for qualification as an airplane pilot these officers are very well qualified indeed. After joining the air squadrons in the fleet further training and special qualifications, however, are necessary. The young naval aviator fresh from Pensacola must first learn to land his airplane on the flight deck of a carrier before he can even fly in fleet maneuvers. The flight deck is a relatively small landing field and viewed from the air in midocean when it is the only landing field in a thousand miles it looks very small indeed. Moreover this landing field is speeding over the water at twenty or thirty knots and rolling and pitching in a most disconcerting manner. "Carrier landing" is a special qualification requiring careful and thorough training. Upon the thoroughness and excellence of this training depends not only the efficiency of carrier operations but in a large measure the safety of the personnel as well. Three years ago a squadron of fighting planes from the carrier *Langley* one hundred miles off the coast of Oregon were caught in the air by a fog. As each plane in succession turned astern of the *Langley* to make its approach for a landing it was lost to view. Suddenly out of the fog astern plane after plane burst into sight and almost in the next instant had safely landed on deck. The

whole squadron landed safely on deck without the slightest mishap. To be sure this was a veteran squadron. If they were not veterans before, they were certainly veterans after this fog experience. The performance would have been impossible but for the thorough qualification and long experience of these naval aviators. When a young aviator is able to take off and land his plane on a carrier he receives training in the technique of fleet maneuvers and in the numerous air missions of fleet aviation. This is the real essence of his training, the real purpose of all his flying. Except for the fact that he is primarily a trained naval officer, efficiency in performing the various naval air missions would be well-nigh impossible.

In the Battle Fleet alone there are sixteen squadrons of airplanes with a total of approximately 225 planes. Under normal conditions there is probably no land base in existence that presents a picture of greater aërial activity than is the case in the daily routine air work of the fleet.

The mission of aviation afloat is to assist the fleet in achieving victory. There are three general duties for aircraft in carrying out this mission: first, to spot the heavy gun fire of the battle line; second, to scout; and third, to operate offensively against enemy aircraft, surface, and subsurface vessels.

One of the most important functions of naval aircraft is the spotting of the gunfire of battleships. Prior to the introduction of aircraft the gunfire in battleships was controlled by officers stationed aloft on the mast who observed the splash of the projectiles, estimated the error in range and deflection and corrected the sightbar range accordingly. This spotting of gunfire is now done by "spotters" in airplanes who take a position not only aloft but as near as possible to the target itself. These aërial spotters are thus enabled to spot the gunfire more accurately and at ranges beyond the vision of spotters stationed on the mast. The result is not only more accurate gunfire at all ranges but accurate gunfire at ranges beyond accurate vision of spotters on the masts of ships. The spotter in the airplane communicates directly to the battleship, whose fire he is controlling, by means of radio. This aërial control of major gunfire is now considered so important that every effort is made to maintain it without interruption for our own fleet and to prevent it as early in the battle as possible on the part of the enemy fleet. The details of this method of aërial control of gunfire are confidential. It is sufficient to say that it is highly technical and requires long and thorough training on the part of the personnel conducting it. Any mistake would be most serious in its consequences.

For carrying out this important function a two-seater amphibian airplane is employed. Each battleship carries its complement of these two-seat spotting planes. The planes and their personnel are considered a part of the battleship's fire-control organization.

The second duty of aircraft with the fleet is that of scouting. For this purpose a two-seater amphibian plane is employed. It is the duty of the observer in a scouting plane to report by radio giving the commander in chief complete information essential to disposing and preparing his fleet for battle and for the conduct of battle once the forces are engaged. This is a peculiarly difficult duty for any officer to perform. He is required to furnish the commander in chief with complete information of every character which is of use to the commander in chief. The performance of this duty requires highly technical knowledge of naval tactics, the recognition of all types, formations and dispositions of naval forces together with the significance of these formations and movements of the enemy. False or incorrect information may lead a commander in chief into fatal mistakes. A naval aviator in this scouting plane occupies a position of peculiar and independent responsibility. A mistake on his part may be fraught with even more serious consequences than one on the part of a spotter.

The third function of aircraft in the fleet is that of offensive employment. This includes attack by fighting planes, torpedo planes, and bombing planes. These types are carried on the carriers only.

The employment of aircraft offensively is illustrated in the maneuvers of the U. S. Fleet last winter at the Panama Canal. In the attack on the Panama Canal the carriers and airplanes of the Battle Fleet were operating at a distance of over three thousand miles from their home base. In the darkness of night six squadrons of airplanes were launched from the deck of the carrier *Saratoga* in midocean 140 miles from the Panama Canal. These squadrons bombed the locks of the canal at the break of dawn and successfully returned to the *Saratoga* at sea and

safely landed on the flight deck. This was a purely offensive air attack conducted several thousand miles from the home base and launched during darkness at a great distance from the objective attacked. In operations at sea during the fleet concentration last winter the airplanes of the fleet made a total of 2,409 landings on the carrier's decks, and flew a total of 5,708 hours with a total airplane mileage of 486,282.

The attack upon the Panama Canal was a bombing attack entirely directed against a shore objective by planes from the fleet at sea. In a naval battle between two fleets we may expect to find the major gun fire of the battleships augmented by torpedo attacks from torpedo plane squadrons and bombing attacks from bombing squadrons. The naval commander will if practicable use both torpedoes and bombs, but the choice of weapon will depend upon the circumstances existing. Low lying clouds might make the use of bombs difficult or impossible or the lack of time for the bombing planes to climb to the high altitudes required might preclude their use. In the Navy the same plane is used both for bombing and for torpedoing in order to avoid multiplicity of types. While a bombing attack is delivered from high altitude a torpedo attack is delivered from a height only a few feet above the water. A torpedo squadron, each plane carrying a torpedo, flies as close to the water as practicable. Each plane releases its torpedo which drops into the water and then proceeds under its own motive power. The torpedo is aimed by the direction of flight of the airplane at the instant the torpedo is released. As an airplane torpedo attack is delivered at comparatively close range to the target the approach for the attack is usually made behind a smoke screen laid by airplane smoke layers.

The fighting plane is an offensive plane pure and simple. It is a single-seat plane of the highest possible performance armed with machine guns and sometimes carrying light bombs. Its duty is to destroy enemy fighters, spotters, scouts, bombers, and torpedo planes. It affords protection to our own spotting circuit, scouts, bombing, and torpedo attacks. It also protects our own carriers and other surface craft from air attack. In addition to the foregoing it attacks with light bombs enemy surface craft, especially cruisers and destroyers, and enemy submarines. The attack of light bombers is delivered in quite a different manner from the heavy bombing attack. The heavy bombers fly horizontally at high altitudes and drop their bombs upon the target. The light bombers dive at enormous speed from high altitudes directly at the target and release their bombs when only a short distance above the target. They rely for safety upon the suddenness of their attack and the enormous speed with which it is delivered. This form of attack is especially effective against exposed personnel because of its accuracy at low altitudes.

The air security of the fleet naturally rests upon its air force. By security is meant the furnishing of all essential information to the commander in chief, the denial to the enemy of information obtained by aircraft and the repulse of all enemy air attacks directed against the fleet. The repulse of an air attack calls for prompt and rapid action. In all air work time is a vital factor. Where minutes or even hours may be allowed to surface craft in meeting a crisis, frequently only seconds are available for aircraft.

Practically all air operations are carried on at great distances from the carriers and in practically all cases entirely out of sight. The commander of the aircraft squadrons is in direct and constant touch by radio with all important flights. He receives all essential information of what is happening in these distant zones and is able to direct, control, and coördinate the work and activities of the various flights. Great latitude and responsibility naturally rest upon the leader of each flight. This squadron or flight leader is the responsible authority present at the scene of action and he has full authority and responsibility for correct action on the spot.

Correct action on the spot demands complete and thorough indoctrination of all squadrons in proper air tactics in their various branches. It is not sufficient that the squadron commanders only be thoroughly indocrinated; each pilot in the squadron must be completely familiar with the squadron's tactics, in order that he may intelligently follow his leader and effectively coöperate in the completion of the mission.

This indoctrination is obtained by an annual aircraft tactical concentration at the Fleet Air Base. The concentration period lasts from the first of July to the first of September. During this time the squadrons train the new officers and thoroughly refresh the older officers of the squadron with those

tactics which experience has proved best. When the indoctrination of a squadron has reached a satisfactory condition the squadrons are combined into wings and the wings into groups and maneuvers on a large scale are conducted with the sole purpose in view of welding the whole air force into effective, powerful, thoroughly drilled striking groups. These groups attack each other, defend each other, attack surface craft, simulate spotting of gunfire, scouting, and all the various phases of naval aircraft activity.

When all hands have become familiar in the air with those tactics which up to that time have been considered sound, the various squadrons and wings proceed with purely aircraft tactical development; that is, experimentation with new aircraft tactics or modification of old aircraft tactics with the thought constantly in mind of ever increasing the efficiency of the air arm of the fleet.

The air units, having attained a high degree of tactical efficiency, enter upon the gunnery exercises to acquire that skill essential to the success of all tactics. These gunnery exercises advance progressively from those of individual pilots performing individual gunnery to the highly involved gunnery exercises involving the entire squadron.

Concurrently with these gunnery exercises the squadrons are embarked on the aircraft carriers and they participate in the monthly exercises conducted by the fleet. These fleet exercises are arranged to present new and increasingly difficult problems to all arms of the fleet and to insure the effective coördination of these arms in major fleet operations and engagements.

It is not sufficient for one officer, commander Aircraft Squadrons, to be proficient in effectively employing aircraft. This knowledge must be possessed by all flag officers. To this end, aircraft on the various carriers, and the carriers themselves, are assigned from time to time in fleet exercises to the various subdivisions of the fleet. In part of a problem the aircraft will coöperate with destroyers; in another part they operate offensively against destroyers; in another part they operate with and against submarines; they operate continually with battleships and these battleship planes must continue their activities during the attacks of "hostile" aircraft. This employment of aircraft on widely differing missions reacts not only to the vast improvement of the air arm, but also and equally important, it acquaints the officers of command rank with the possibilities and effective means of employing aircraft to further the main mission of the fleet, the destruction of the enemy.

The culmination of the year's operations arrives when the carriers with their squadrons participate in the annual cruise of the fleets. On these cruises, the year's efforts to perfect the detail of aircraft operations are given the test of simulated major campaigns against possible enemies.

Our efforts in the past have been crowned with a certain amount of success, but every success has only indicated new possibilities of the employment of aircraft in fleet operations and has emphasized the vital importance of continuously operating with the fleet the maximum number of aircraft that can be carried on our surface vessels.

Courtesy Office of Naval Intelligence, Navy Department

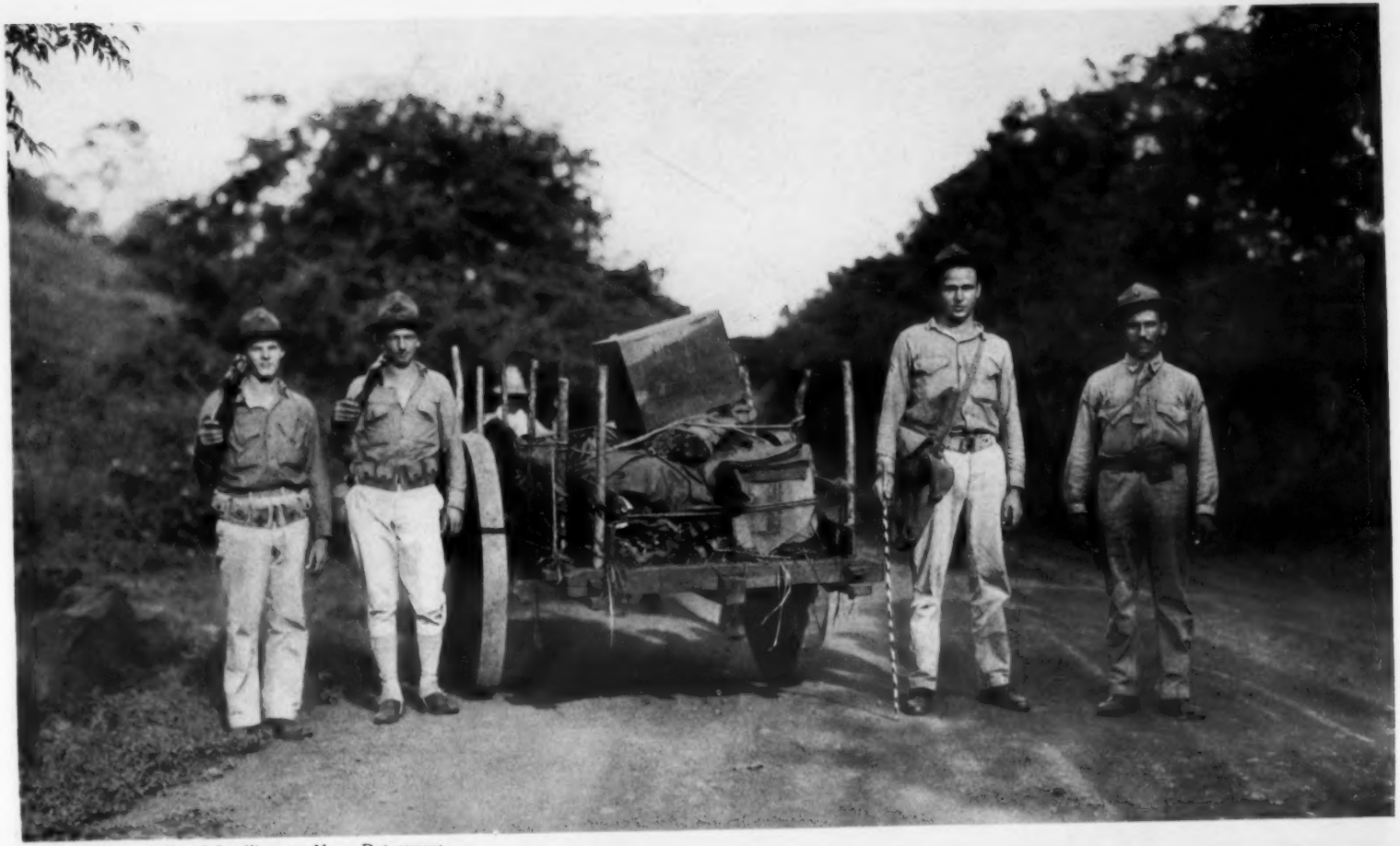
A MARINE PACK TRAIN, NICARAGUA

Courtesy Office of Naval Intelligence, Navy Department

MARINES COÖPERATING WITH NICARAGUAN OFFICIALS IN REGISTERING VOTERS

Courtesy Office of Naval Intelligence, Navy Department

A NICARAGUAN POLLING PLACE



Courtesy Office of Naval Intelligence, Navy Department

BRINGING IN THE BALLOT BOX FROM A REMOTE VILLAGE

Courtesy Office of Naval Intelligence, Navy Department

PREPARING TO COUNT THE VOTES IN THE RECENT NICARAGUAN ELECTION

Courtesy Office of Naval Intelligence, Navy Department

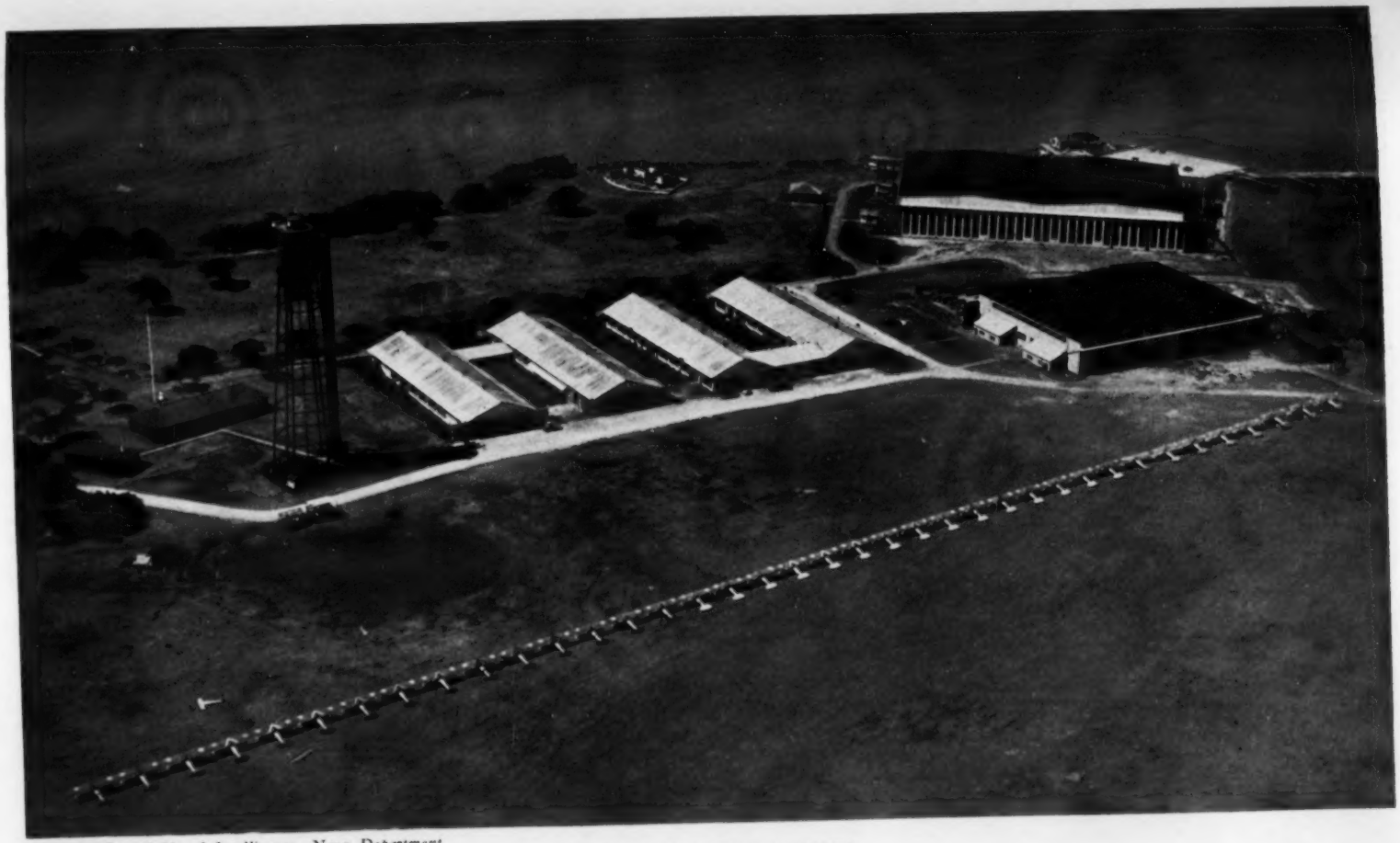
NAVY PLANES LAYING SMOKE OVER A CITY

Courtesy Office of Naval Intelligence, Navy Department

NAVY PLANES IN FIGHTING FORMATION

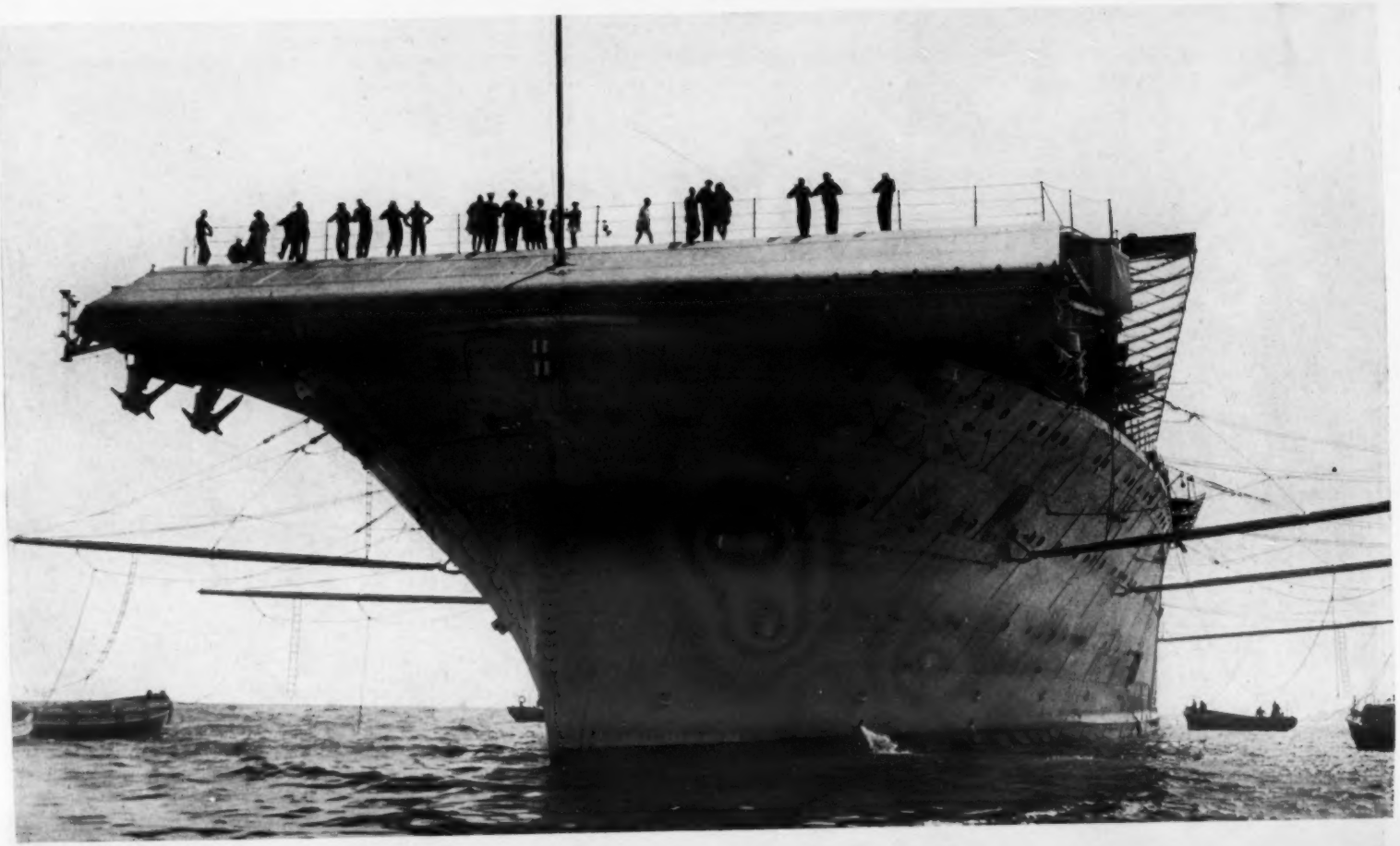
Courtesy Office of Naval Intelligence, Navy Department

FIGHTING PLANES OF THE FLEET



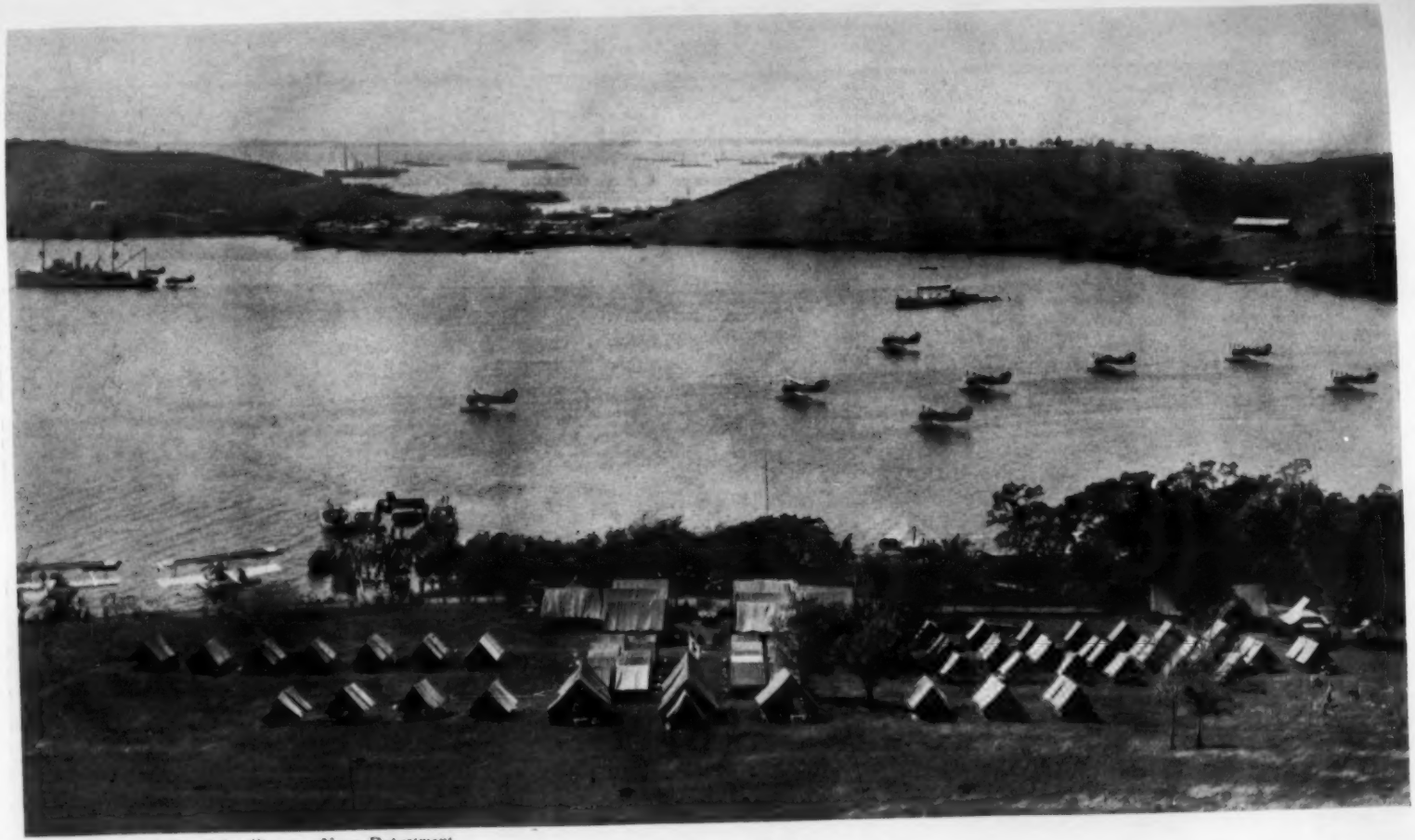
Courtesy Office of Naval Intelligence, Navy Department

AIRCRAFT FROM U.S.S. *LANGLEY*
Ashore at Ford Island.



P. and A. Photo

VIEW OF THE STERN OF THE AIRCRAFT CARRIER U.S.S. *SARATOGA*



Courtesy Office of Naval Intelligence, Navy Department

EYES OF THE FLEET
In a cove at the fleet base.

International News Photos, Inc.

STEALING THE SHOW

The *Graf Zeppelin* at Lakehurst. Germany has focused the attention of the world with her aircraft and marine activities. The *Graf Zeppelin's* globe-circling accomplishment was the outstanding aviation achievement of the year.

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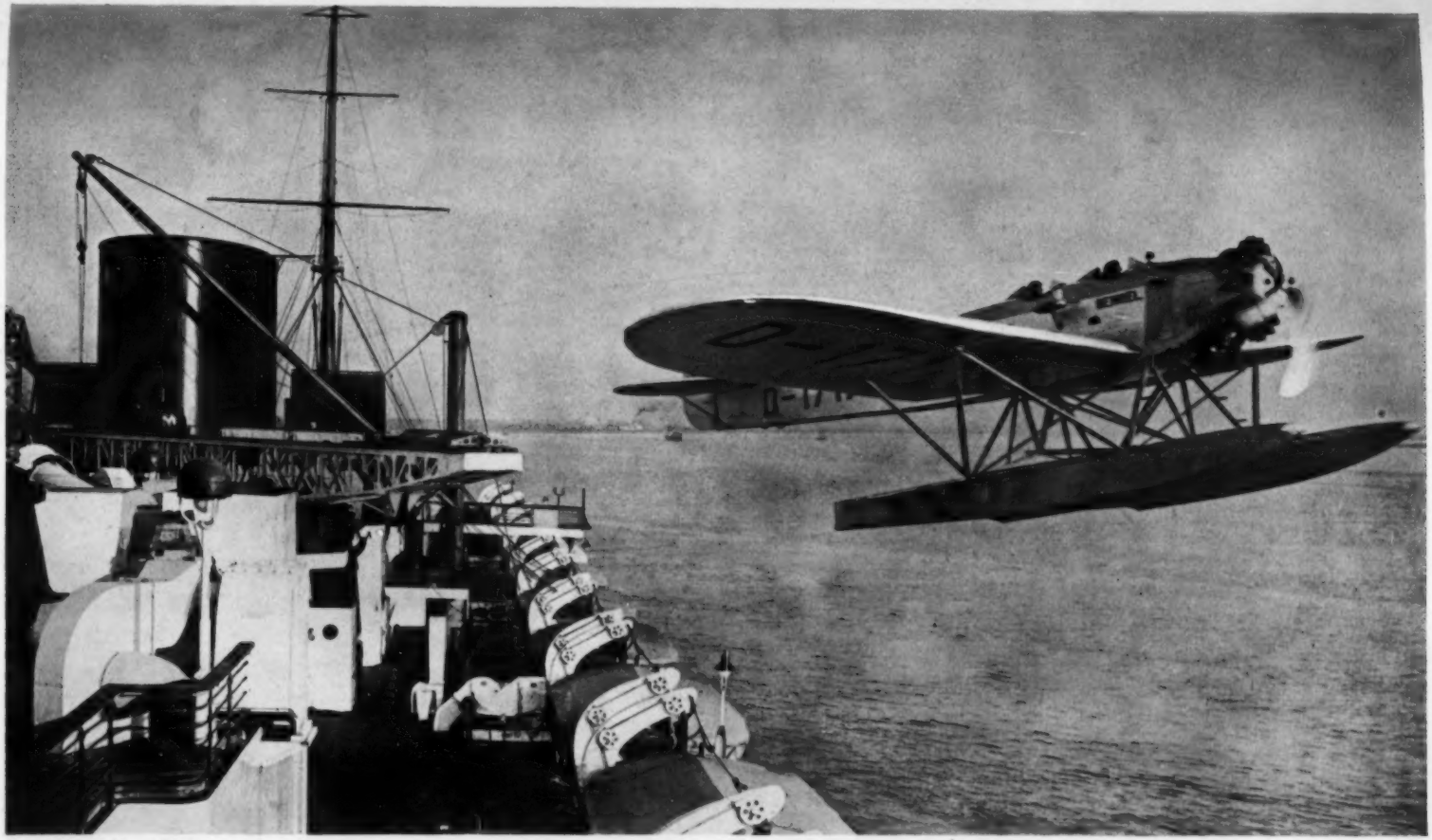

International News Photos, Inc.

THE *BREMEN* LAUNCHES HER MAIL PLANE

Not content with beating the transatlantic record, they rush the mail ahead.

International News Photos, Inc.

THE MAMMOTH GERMAN AIR LINER, *DORNIER X*

With a passenger capacity of 120 persons and an air radius of 650 miles, this aircraft surpasses anything yet built.

International News Photos, Inc.

THE MAMMOTH GERMAN AIR LINER, *DORNIER X*.
With a passenger capacity of 120 persons and an air radius of 650 miles, this aircraft surpasses anything yet built.

International News Photos, Inc.

THE *DORNIER X* IN THE AIR
She was not only conceived, but she actually flies.

Courtesy Office of Naval Intelligence, Navy Department

U.S.S. *LOS ANGELES*, ARMY AND NAVY BLIMPS
In the first aërial inauguration parade, March 4, 1929.

The Air Service *in* Minor Warfare

By MAJOR ROSS E. ROWELL, *U. S. Marine Corps*

THE events which led up to the American occupation of Nicaragua and the Stimson disarmament agreement have been described many times. I shall therefore assume that the reader is reasonably familiar with them and recall only such facts as bear directly upon the part played by the Marine Corps air squadrons in the pacification of the country.

On February 16, 1927, the air squadron which I was to take to Nicaragua was stationed at San Diego. Early that day we received orders for expeditionary duty. Our planes had been flying daily, but no special preparations had been made for overseas service. In two days after the orders were received we were ready to sail completely equipped; all planes were aboard ship as well as everything else required for three months in the field, including oil and gasoline. We arrived in Nicaragua nearly ten days ahead of the main body of the expedition.

Upon arrival at Corinto we disembarked in about ten hours and went to Managua aboard a narrow-gauge train. There we immediately established an airdrome. Everything was under canvas. We operated from that camp for almost a year and during that time had no permanent shelter. In fact, we had no shelter whatever for the airplanes. This is worthy of note because the weather conditions were exceptionally severe. There were torrential rains followed by dry periods when the trade winds blew from thirty-five to forty miles an hour and fine volcanic dust permeated everything. These conditions were very trying, yet we were able to keep the ships in the air almost every day. The wooden ships did not stand up long, but when we got steel ships and plenty of spare parts we were able to operate very successfully.

We used the same airdrome as did the Nicaraguan Air Force, which comprised three old commercial planes and two American adventurers named Mason and Brooks who flew them. Mason and Brooks had native ground crews but did their own work on the planes and manufactured their own bombs. The bombs were made by filling a section of iron pipe with three sticks of dynamite and adding a percussion fuse. They had no safety fuses. I asked them why they did not procure effective bombs. They replied that there was nothing better available, but that it was not a matter of great importance as their primary object was not to cause great damage or loss of life among the enemy, but to raise the morale of the government troops. They used to take off with a lap full of their home-made bombs and drop them by hand over the enemy lines. Sometimes they carried an ordinary hand camera with which they would take snapshots of enemy positions.

The enemy suffered little from these air operations. Many of the bombs failed to explode. After the armistice I asked General Moncada, leader of the revolutionary forces, about these air attacks. "I want to express my gratitude to those gentlemen," he replied. "They helped me out of many a hole. My ration supply was poor, and every time they dropped bombs we got enough dynamite to obtain a good meal of fish for our whole army."

At that time there were about 6,000 revolutionary and government troops in the field. This was a rather larger force than we expected to find organized and in daily combat. These two armies were milling about in an area some fifty to sixty miles from Managua. When we were ordered to make daily observation flights over the front we felt that we had secured excellent reserved seats for the show. However, we soon realized that the revolutionists did not discriminate between us and the Nicaraguan government fliers. They regarded all planes as fair targets. Early in the game the revolutionists caught one of our ships at a low altitude and put

twelve holes in the fuselage in a few seconds. Although General Moncada issued orders against firing on American planes, the shooting continued except in the immediate vicinity of his headquarters.

We carried only front machine guns; we had no rear guns or bombs. We had authority to return hostile fire, but the American mission was to stop the war—not to become involved in it. I appealed to all pilots to avoid hostilities and to return fire only when necessary to save their own lives. During the period of observation our planes were actually hit twenty-three times.

We continued our daily flights under these dangerous conditions because we were gaining valuable knowledge and experience. At first our planes were hit every day, but we made an intensive study of effective ranges and kept careful data. We soon learned where they could hit us and where they could not. In this way we reduced the hazard without interrupting our observations. With 6,000 men in the field the operations were large enough to be well worth our study. We were able to observe their tactical methods and learn where they placed their command posts. We became familiar with their methods of deployment and learned how they dug in. We also watched all the operations of the Nicaraguan Air Force. It was splendid training for the campaign which followed.

About the middle of May Mr. Henry L. Stimson, now Secretary of State, came down as representative of the President of the United States. He succeeded in arranging an armistice and induced both the government and revolutionary forces to turn in their arms to the Americans. During the conference General Moncada expressed fear that he could not control all the elements of his command. His fear proved to be well founded. As soon as the Stimson agreement was announced Augustino Sandino, chief of a group of about three hundred men from northern Nicaragua, rode away from Moncada's camp with all of his armed followers. He declared he could not agree to the terms Moncada had accepted. He was not pursued immediately because we hoped to bring him around through persuasion. At that time Sandino was not the only one of Moncada's subordinate chiefs who had not turned in his arms. There were a number of scattered bands still in the field. If we used force on Sandino we might lose all chance of inducing these men to accept our terms. So we continued our negotiations with Sandino and soon all the others were disarmed without trouble.

By that time Sandino and his band were well up toward the northern wilderness in the province of Neuva Segovia. His pursuit had become a serious problem. Nicaragua is wild, rugged, jungle country. Men who know the Philippines admit that the going is even harder than in the jungles of those islands. There are trails that even mules cannot cover. It is the only country where I have seen bull pack trains, that is, bulls carrying packs like mules. Bulls, with their cloven hoofs, can go through swamps where no other pack animals can pass. In spite of these almost insurmountable difficulties our troops managed to establish posts throughout the country and outposts in the remote sections. We went after Sandino and caught up with him in the northern hills—and when I say hills, I mean big ones. We sent his friends and relatives out to persuade him to come to terms. We offered him very possible inducement. We still hoped to succeed by peaceful methods, but in the meantime Sandino was going further and further into the wild province of Neuva Segovia, where there are no roads worthy of the name and where even trails are rare.

Finally Sandino broke off all negotiations. He captured an American-owned gold mine which he operated for his own benefit. He declared himself ruler of an independent province and reorganized his band as an "army." He had two or three hundred modern rifles and several Thompson and Lewis guns. We occupied Ocatal, capital of the province in which he was operating. It was a small garrison and included a platoon of the nonpartisan Nicaraguan force which we were organizing to police the country.

All this time we were keeping in touch with Sandino by aircraft. However, we never let more than two planes pass over him at a time. This gave him the idea that we had only two ships and prepared the way for a surprise. Sandino started shooting us up as soon as we began reconnaissance over his lines. Whenever we appeared all hands would turn out and fire at the planes. We would count the men and guns and then go on to the next place. We were hit a few times, but we found out what Sandino had

When we finished taking this census we began to return their fire in an erratic manner with our rear guns. We also dropped a few harmless "firecracker" bombs. This was the situation when the real fighting started. In the meantime we were maintaining daily air liaison with our own columns and outposts.

At one o'clock on the morning of July 16 Sandino with an overwhelming force fell upon the little garrison of Ocatal without any warning whatever. About nine o'clock that morning two patrol planes flew over Ocatal and found that the landing field, which we had built on the outskirts of the town, was strangely deserted. They passed over the post in the center of the place and discovered that the garrison was in a state of siege. Our ground troops laid out panel signals saying that they were being attacked and were in desperate circumstances. The planes returned to our base and I reported the facts to the commanding general.

The only available reënforcements were a column which was then marching toward the besieged town, but it could not possibly reach the place for six days.

The commanding general told us that the air force was the only unit that could give immediate assistance to the besieged garrison. At that time we had only five airplanes of the DH type capable of fighting. The distance was 110 miles and the weather was bad, but there was nothing to do but go.

It was our first experience in real fighting. In order to get results we would have to employ low-altitude bombing. Knowing how we had already been hit at fairly high altitudes, I was not at all sure that such an attack would succeed. However, we took off for Ocatal with all that we could carry in the way of bombs and machine guns. Storms surrounded us on all sides. We could not stay on the course and were obliged to wind our way through the mountains. We arrived about two o'clock in the afternoon. As we came in I closed the column up to a tight "Vee" formation. We hoped at least to make the enemy think that our morale was high. As we approached the town they opened up on us with machine guns from an outpost. We immediately broke up into column and made a circle to the left around the city.

All the information I had was that our people were besieged. It was vital that we learn the positions of the enemy lines and of our own troops. And we must learn this quickly, for we had only enough gas to stay there for about forty-five minutes. As we circled the town I made a hasty reconnaissance and decided that the southeast corner was the place to start the fight. There was considerable activity there, and I judged that the command post was in that vicinity. I had only a fleeting glimpse of our garrison, but it was enough to show that the marines and native troops were still holding the fort.

On our second approach we went at them. It was our first engagement but it was the most dramatic fight we ever fought. The setting was theatrical in the extreme. On the ground our men were fighting for their lives, and they had been fighting for sixteen hours without sleep or food. They did not know how much assistance we could give them, and we ourselves were none too sure. I went in first, leading the attack. As I went down I could see enemy troops firing in groups. They were absolutely unconcerned. Just before I dropped the first bomb I saw a puff of smoke come from a man sitting on a horse and smoking a cigar. After the first bomb dropped the whole picture changed. We could see enemy groups milling around. Then they seemed to hesitate as if they were too surprised to know what to do. Complete panic followed the second and third attacks. Men threw away their rifles, jumped over fences and raced wildly through the streets. Everywhere they went planes were diving at them. After we finished our bombing my men became so interested in chasing enemy groups out of town and down the road that I could hardly assemble them to return before our gas was exhausted. It was a complete rout for Sandino.

We flew over Ocatal again the next day to observe the situation and bring out wounded. We were ordered not to pursue the enemy further at that time. The commanding general told me we had better give them a chance to go home and behave themselves. We did this and they retired in small groups, with every appearance of having had plenty of war.

Sandino, however, was still in the field with a small group of followers. He retired further into the mountains and continued recruiting. He was joined by many adventurers from countries north of Nicaragua. It was not long before he was ready to continue operations.

When trouble broke out for the second

time our front lines extended some 150 miles across jungle country and were held by only two regiments. Our columns were so far flung that they were almost beyond control by ground communication. The air force probably did more for the ground troops in that campaign than in any past military operation. It was a special situation but there is much to be learned from it; for every special situation has much in common with another. The missions which we carried out were infantry liaison, combat support, reconnaissance, air transport, and independent missions. We also served as a mobile reserve.

It was aircraft that bound our scattered ground forces together and made it possible for them to function as an organized whole. The liaison planes always worked in pairs. We had to be prepared at all times to give support to the ground troops, and sometimes a liaison patrol would suddenly become a combat patrol. Such support was frequently needed by the men who were fighting on the ground. We sent an air patrol to each regimental area daily. Marching columns were visited at least once every twenty-four hours and sometimes twice. If the situation appeared to be more serious than usual, we employed three planes; not because they were necessary for liaison but to provide a tactical unit for combat support.

We established advanced airdromes all along the front. Air patrols had to go a hundred miles to the advance-base airdrome to really begin operations. Our base airdrome was at Managua, far from the front, but it was the only possible location. A railroad leads into Managua from the coast, but it ends there, and beyond it there are no feasible routes of ground communication. It is impossible to send pack trains or bull carts over Nicaraguan trails with gasoline, oil, and engineering equipment in quantities sufficient for air operations. Beyond Managua we were limited to what we could supply by air. When we selected an advance airdrome we supplied it from Managua by air and then operated from it as an advance base. The planes operating from these advance airdromes were two-seaters, carrying an observer and pilot. We used some enlisted pilots and observers, but always in the company of commissioned personnel.

A liaison patrol began its day's work by visiting the regimental command post located at the advance flying field. There its leader would meet the operations officer, get the latest information and receive small articles and mail to be dropped. The planes then visited the various columns. As they approached each column they signaled. Immediately the ground troops laid out their panels and exchanged information. The patrol would then drop its mail and small packages. On pay day packages of money were dropped to the more remote commands which could not be reached by a paymaster on the ground. Large sums were handled in this way and not a cent was ever lost. We used a message pick-up system which worked well. By this method we brought in packages of mail and pay rolls weighing as much as six pounds. Patrols sometimes made as many as ten pick-ups in one flight. Immediately after the deliveries and pick-ups were accomplished the patrol would conduct a reconnaissance for the column and give them a report. It would then proceed to the next.

The fact that we were able to visit the columns every day had a tremendous effect on the morale of the men. When there were wounded we dropped anti-tetanus serum for them. This serum has to be kept on ice. It was therefore impossible to keep it with the columns, but we could get it to them by air while it was still cool enough for use.

A complete chronological report of every flight was rendered immediately upon the return of an air patrol to its base. These air reports became so popular that all troop commanders constantly requested them. We could furnish only eight copies; some went to the columns or outposts immediately concerned, one was sent to each regimental commander, the others to the brigade. Later these reports were mimeographed and distributed daily throughout the brigade. They were sought because they gave a complete picture of conditions on all parts of the line. They were really the best source of information on what was happening everywhere.

The value of having this sort of liaison by air was shown at Ocatal. In the matter of combat support it developed that the air squadrons could drive off the enemy in case our troops were outnumbered. We operated in much the same manner as the field artillery supports the infantry. It was soon found that planes could effectively support our infantry columns in time of need. Thus it came to be taken for granted that we were

in the position of a mobile brigade reserve at all times. An example of support from the air for forces on the ground followed the crashing of one of our planes in enemy territory. The observer and pilot got out of the plane unhurt, but the ship burned. They were set upon by bandits and fought until they were killed. A ground patrol was sent out to investigate. This patrol ran into a nest of bandits and were surrounded by overwhelming numbers. They sought refuge on the top of a hill where our planes found them. The country was so heavily wooded that our observers could not see the enemy and could barely make out our own men. In response to a message dropped from a plane asking for the location of the enemy, the besieged patrol laid out an arrow and the range in yards. The planes then dropped bombs into the bush in the area indicated and received a report that the result was highly satisfactory, and the patrol was able to escape. After that we adopted a prescribed system of conducting bombing by aircraft under the control of ground panels similar to the way in which artillery fire is controlled.

We were again called upon to extricate ground troops from a dangerous position at the little town of Quilali. Air observation had shown that Sandino's forces were occupying a high mountain called El Chipote. A combined air and ground attack was planned. The ground column, however, never reached the mountain. They were ambushed by a much larger force of the enemy and surrounded in Quilali. They were burdened with wounded men and all their officers had been either killed or wounded. Their ration train was five miles away, also surrounded by outlaws in overwhelming numbers. The officer in command of the train escort had been shot through the head, his second in command had been killed and a sergeant was in charge. Planes escorted a platoon out from Quilali to bring the ration train into town. The officer commanding in Quilali then reported by message-pick that he was outnumbered, burdened with sick and wounded, and with a supply train so long that he could not protect it on the march. He did not believe that he could leave the place without further casualties unless he had some help. The air force was the only unit that could render help at that time.

Headquarters asked us to submit a plan for getting the column out of Quilali. It was first necessary to get out the wounded. Lieutenant Frank Schildt landed in the village street and in ten trips brought out eighteen of the most seriously wounded. This remarkable exploit won Schildt the medal of honor. He was under fire on every trip. He not only saved several lives but took in 1,400 pounds of medical supplies and a new commanding officer. Then came the problem of getting the column out. It was finally decided to bring them out with an air escort only. We planned to use continuous air support basing on Ocatal. On the day set for the start the ground force was ready to move. The first air patrol in the early morning flew over Quilali and signaled "Forward march." We marched them under continuous air escort during the flying hours of the day, then halted them for the night and repeated the operation next day. We proceeded in this way for two days. As soon as one patrol had reached the limit of its fuel, it was replaced by another, so that the air support was never interrupted. We broke up three or four ambushes during the march. Enemy dead were found on the trail where we had engaged them from the air, but not one shot was fired at the ground column. I mention this to show the faith which the ground troops came to place in the fighting power of the planes.

After the Quilali incident we escorted the column to a new position where it was reenforced by two hundred more men. Further plans were then made to capture the new Sandino stronghold. The brigade commander sent me over Chipote again for observation. I did so and estimated that there were 1,200 armed men on the mountain. They were dug in with machine guns well placed and clear fields of fire. The mountain is 3,000 feet high and can only be approached through deep, narrow ravines. After I made my report the brigade commander decided that he did not have enough troops available for a successful ground attack without severe casualties. He ordered us to stage an independent attack from the air. We had only four of our new planes at that time, and the DH's could not be used in such an operation. I was not confident that with four planes we would have sufficient fire power to cover the place. However, we loaded some 50-pound demolition bombs and some of the 17-pound fragmentation type and took off for El Chipote.

We climbed up 7,000 feet above a layer of cumulus clouds, went around well to the south of the hostile position and made an approach from the east. This was the reverse of the direction from which we had always come in the past. It so happened that there was a hole in the clouds directly over the bandit position. I had decided to use pursuit tactics in the attack. We went in with two columns, making almost vertical dives through the clouds. We had only about 3,000 feet to go, and as we dipped over to start down they saw us coming. It happened that they were gathered on the mountain top in unusually large numbers. The first thing I saw was a barrage of skyrockets. Eight or ten of them rose from the sector I was covering. Later I heard it claimed that each of these rockets was equipped with a stick of dynamite that would destroy a plane. However, no one was hit, and I did not see any of them explode. Nevertheless, they did annoy some of the pilots considerably. We went down in such a swift attack through the clouds that we caught the outlaws perfectly. They had dug numerous round holes about the size of barrels. These were fairly good cover from bomb fragments, but we sprayed the mountain top with machine-gun bullets, and after the first 50-pound bomb landed things began to move. There were several buildings on the peak. In one of these about forty men were hiding. When a bomb blew in one wall of this shack the outlaws streamed from the others in droves. We kept after them until they disappeared in the ravines.

Then and there Sandino lost most of his new recruits. They went home, leaving him with only about two hundred of his more seasoned followers. From that time on we were able to keep them moving most of the time. We kept them off the roads and more visible trails during the day and out of organized positions.

When we found that propaganda was one of the chief weapons being used against us we decided to put down a counterbarrage. We dropped thousands of propaganda circulars from planes, sometimes over enemy camps and sometimes in neutral territory. They were really effective. We were frequently shot up during these trips, but that was to be expected.

Air transport in war was then entirely new. We employed it to a large extent considering the size of forces. We began to receive three-engine transport planes in December, and others arrived monthly. They were all flown down from the United States, making non-stop flights from Florida to Central America. At the time I left the country we had five. We flew these big ships all over the occupied area and landed some of them on fields right on the front line. Our most northern outpost had a garrison of about seventy-five men. They were supplied entirely by the transport planes. We flew everything to them that they ever received. The transports were also used to carry out minor troop movements. Sometimes we would carry as many as one or two hundred men from one place to another, completing a movement in two or three hours that would have required two days of marching. All of our sick and wounded were evacuated from the front by the transport planes. In one morning we brought in twenty-nine sick and wounded. They were flown a hundred miles that would have required days of travel by road. The planes also carried large sums of money to the hill stations. Over half a million dollars was carried to the front areas by plane. Most of it was dropped in packages of two or three thousand dollars to be used for pay and local purchases. We never lost a penny of this money. In less than eight months we carried 2,000 passengers and a million pounds of freight without accident.

While I was in Nicaragua we were actually operating against bandits for thirteen months. During that time we had eighty-six contacts and were hit eighty-four times. It does not seem possible that ships could be hit eighty-four times without a single death. As a matter of fact we had only one officer wounded while in a plane. He was shot through the foot. We never had a plane shot down in action and never had a fatal accident in action. However, I think that luck entered into our operations in no small measure.

The infantry officers of the brigade were most enthusiastic about the coöperation which we were able to give them from the air. When this was written there were twenty-six modern planes supporting the ground troops in Nicaragua. All of this increase was the result of the urgent demands made by ground commanders and not by our own personnel. In time the air-

craft squadrons became a sort of executive organization intimately concerned in every maneuver and operation. They brought in the original reports, conducted reconnaissance, transported staff officers back and forth from the the front, carried out orders to the troops, participated in actions, brought in reports on them afterwards, and kept the brigade commander in close touch with his far-flung units.

Enlisted Training *in the* Navy

By COMMANDER D. E. CUMMINGS, *U. S. Navy*

BEHIND the present rapid expansion in the methods of training enlisted men lies a rapid change from the days of sail and smooth-bore which could be handled by almost any kind of labor.

Long voyages, poor food, bad living conditions, and simple methods did not need and did not attract, in those days, a very high grade of labor.

While the great transformation began with the introduction of steam, how recent the really modern ship is will be realized when it is recalled that at the beginning of the cruise around the world in 1907 there were no fire-control systems. On the way around the Horn the crews, themselves, installed the crude fire-control systems from which grew those of today. Before that there were no range keepers, no directors, no fire-control communications, no plotting rooms.

The development of fire control, together with radio, gyro compasses, oil burning, aviation, chemical warfare, has called for men and methods capable of meeting the new requirements. It is not so long since the machinist's mates, watertenders and enginemen of today did not exist, and in their place were men whose most important accomplishment was the ability to lay hands on the right halyards in the dark. Today's director pointers and gun pointers did not exist; in place of them was the gun captain who sighted along the line of metal. The modern shipfitter and oxyacetylene welder did not exist; the carpenter and the shipwright, together with the sailmaker, were the principal artificers of the ship. Cutlasses meant much to a seaman; gas masks, nothing.

Ashore, a similar demand for better men has brought about the establishment of personnel departments in most of the great industries, such as the Standard Oil of New Jersey, American Telephone and Telegraph, General Electric, and Ford Motor Company. These industries go to great expense to find means for selecting suitable men for employment, assigning them to the kind of duty for which they are best fitted, and training them for efficient performance of their duties. The Bureau of Navigation is the personnel department of the Navy, and is actively engaged in studying these problems.

The initial problem is the recruiting of men capable of reaching the new standards required of naval personnel, and progress is being made along this line. Something more than 40 per cent of our recruits have been to high school. Many are graduates. Within the last five years the average mark of all newly enlisted men in the General Classification Test, which indicates ability to learn to adjust one's self to high-class duties, has risen 10 per cent. We are getting a great deal of excellent raw material into the service. What are we doing with it?

A recent article by the chief of the Bureau of Navigation stated the problem as follows:

> That the Navy is constantly taking thousands of untrained men and boys from civil life is so well known by the average person that he accepts it as a matter of fact. He knows that these men become a part of the Navy's working personnel, taking the places of thousands of trained men who leave the service each year and return to civil pursuits. He also knows that, somehow, this tremendous absorption of new and untrained men into the naval establishment seems to make no break in the effective operations of naval ships.
>
> Those who deal closely with the training of men for specialized work in civil life will know that somewhere and somehow a tremendous problem of training and education is involved in making these untrained thousands of men into intelligent and effective units of the Navy's personnel. A blue uniform may work a quick transformation in the bearing and appearance of a recruit, but it carries no magic that can transform the untried and unskilled boy into a skilled electrician, a competent engineman, or an aviation machinist's mate fit to condition planes in which men must risk their lives.

The training of enlisted personnel is a tremendous, all-hands' task that will never end until human intelligence and skill cease to be a deciding factor in the effectiveness of ships.

The major portion of this great task of training must be done at sea. The weight of the task that falls directly on the fleet is shown by the following figures: of the total of 84,000 men allowed the Navy, the operating force plan calls for 60,186 afloat, including aircraft attached to fleets. The number of first enlistments during the fiscal year 1928 was 17,002. Practically all of these newly enlisted men go afloat during most of their first enlistment, and they constitute about 28 per cent of the men afloat. Thus, every year the fleet must absorb and train 28 per cent of new men.

ing must be sufficiently early and sufficiently concrete to make them earn their pay within that period. For those men who reënlist, the entire first enlistment may be considered as an apprenticeship and only the service afloat where actual operations are going on can insure that this apprenticeship shall be better than the haphazard process of learning by experience alone, and shall result in producing men well qualified to carry on the work. Seventeen years ago under the direction of the executive officer, now Rear Admiral J. R. P. Pringle, the *Nebraska* was reorganized. The new organization contained the earliest list of requirements for advancement in rating that I know of. Since that time such lists have grown into fairly complete rating specifications which are found in the Bureau of Navigation Manual.

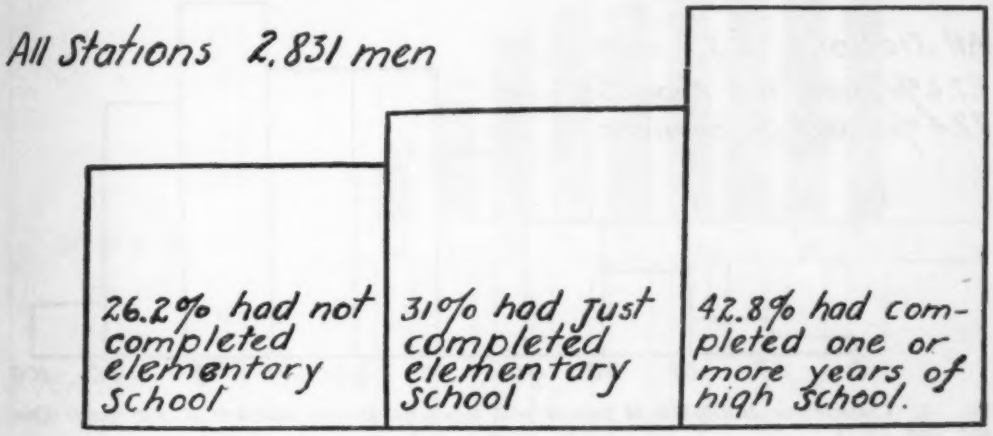
All Stations 2,831 men
26.2% had not completed elementary school
31% had just completed elementary school
42.8% had completed one or more years of high school.

Fig. 1. Characteristic distribution of recruits with regard to previous schooling. (May and June, 1927)

To assist the fleet in this task, the bureau operates the training stations and service schools. The Navy cannot spare many men to be kept ashore for school purposes, and therefore, the school program must be kept to a minimum. The bureau therefore provides training courses to assist the forces afloat and ashore in this training program. There is no escape from the fact that officers afloat are faced with training these 28 per cent of new men every year, and this training must be thorough, in order that the exacting requirements of operation of naval material afloat can be met safely and adequately by these men.

The necessity for thorough, systematic training is the more urgent since men are enlisted for only four years. Their train-

This development is still going on. Somewhat earlier a young division officer, feeling the need of suitable material for instruction of the men of his division, proceeded to prepare such material. In 1902 this officer, now Rear Admiral Ridley McLean, published the results of his labors in the first *Bluejackets' Manual*. Other manuals, some for recruits, some for the engineers' force, indicated the growing need for instructional material; the rapid technical growth of the Navy made provision of such texts increasingly necessary.

Unfortunately, the first departmental effort to meet this need imposed a school system on the fleet covering many subjects not necessary to improve the efficiency of the men in their naval duties. This was

not only not successful, it created distrust of departmental training activities of this kind. The conclusions drawn from experience with the early training courses as stated by Rear Admiral Ashley H. Robertson in 1921, are as follows:

Briefly the commander, Destroyer Force, is of the opinion:

First, that an educational system in the Navy is essential to educate men in the various skilled trades found in the Navy.

Second, that with such a system men who take advantage of it will become highly educated in a vocation and that their doing so will not only result in great advantage to the Navy but also will train and educate them so they can follow those vocations after they leave the Navy.

Third, that the system should cover only such trades, occupations, and vocations as are found in the Navy, and should cover them only to the extent they are used in the Navy.

Fourth, that the system should be built into the organization and *routine* of the Navy just as are the systems for drilling or training men in practical work and that in the daily period for "drill and instruction" a definite part of the time should be devoted to "instructing" the men in the courses they are taking.

Fifth, that when a man elects to take a course he should be assigned to a billet or division where he can practice the trade he is studying and that his daily work should be on the kind of work in which he is taking a course. (In other words men taking the electrician course should work with electricians, men taking engineering should work in the engineers' force, etc.)

Sixth, that the Navy should acquire or get up its own courses of instruction and they should cover a trade exactly as that trade is practiced in the Navy. (The usual "correspondence course" has no place in the Navy system. Our system calls for their plan and methods but not their material.)

Seventh, that inasmuch as the main reason for an educational system is to help the Navy (not the men) the course *should be free.*

Eighth, that "correspondence school" methods will not suffice for our system. Our system requires practical everyday work in the trade, backed up by voluntary *study* outside of working hours, and augmented by regular and routine *instruction* given at fixed times during working hours.

An exhaustive study by Rear Admiral R. H. Leigh, then commanding the *Tennessee,* adds the practical requirements that sufficient officers to administer the system adequately are an essential and that necessary groundwork in the three R's should precede any attempt to handle technical subjects. He says pertinently: "The average officer does not relish the idea of being a school teacher except in practical military and naval subjects."

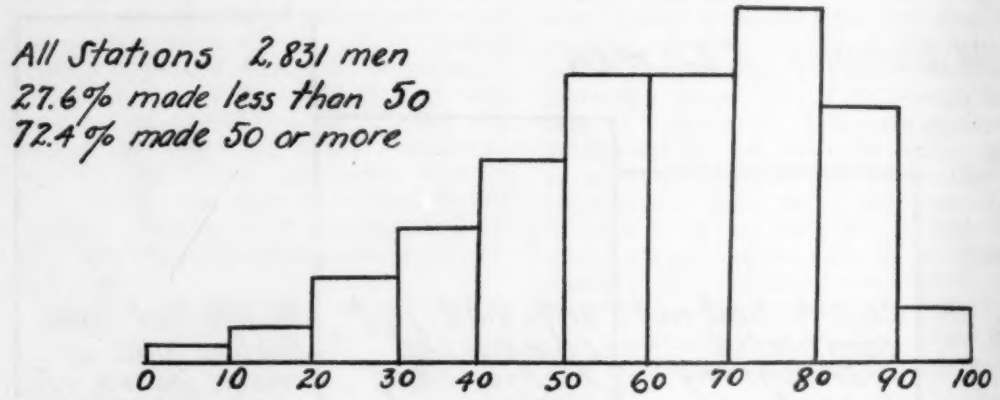

FIG. 2. Characteristic distribution of recruits with regard to general classification test score. (May and June, 1927)

These and similar reports pointed the way to a system of instruction confined to subjects which directly assist in training men in their naval duties.

The only courses now issued that are not strictly naval in character are in subjects such as English and mathematics, together with Naval Academy entrance subjects. Earlier issues, obtained from various sources, included syllabus courses which laid out a program of study based on textbooks, not always readily available to the students; others were fitted to produce theoretical engineers rather than practical artisans; some were subject courses, such as that in Curtis turbines. To cover the material necessary for advancement to a given rating, a man might have to take several such courses; and in so doing include

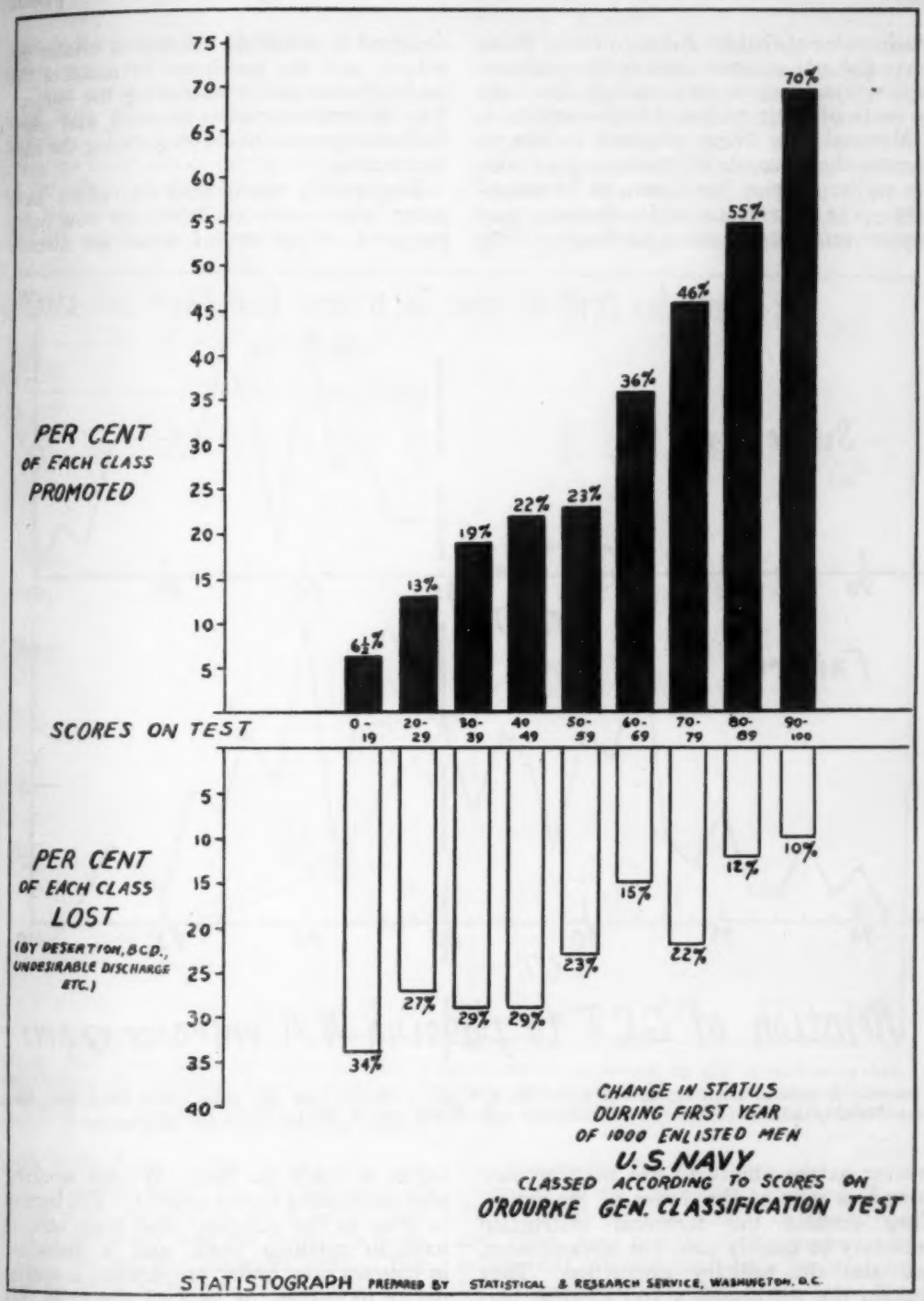

FIG. 3. Graph showing the high ratio between score on G.C.T. and early advancement, and also inverse ratio between G.C.T. and disciplinary losses.

much material that he did not need. These texts did not instruct men in the military duties pertaining to their ratings, but only in parts of their technical requirements.

Material now being prepared endeavors to meet the demands which experience with the earlier courses has shown to be necessary. The courses are self-contained; they require reference to other publications only insofar as the ability to use such publications is a part of the duties of the rating. They contain the technical instruction necessary to qualify men for advancement, and also the military instruction. They contain the mathematics and English pertaining to the rating, and this is so distributed through the courses as to give time for the student to absorb them gradually and easily. They contain questions especially designed to assist the student to master the subject and the instructor to measure the student's success in mastering the subject. The illustrations are numerous and especially designed to assist in grasping the subject matter.

Engineering rating courses, which have never before been available, are now being prepared. The first of these has already begun to reach the fleet. We are working also on aviation rating courses. The bureau is alive to the difficulty that busy officers have in marking work, and is including in courses now under preparation a special device to lighten the load of officers in this respect. In these a separate pamphlet will contain examinations on each assignment and on the course as a whole, so arranged that by the use of a "gouge" that comes

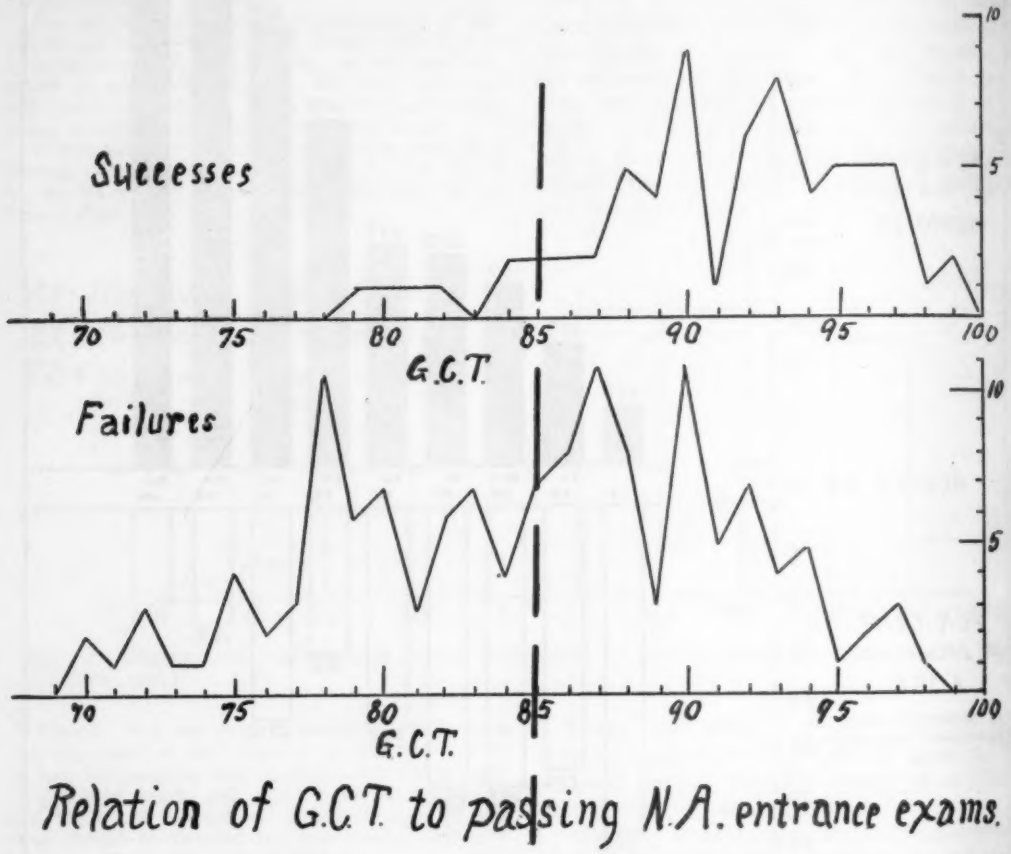

Fig. 4. A general classification test score which would eliminate half the unsuccessful candidates for the Naval Academy (85%) would eliminate only 7 per cent of the successful candidates.

with it, the officer can check the correct answers very readily.

These examinations, while thorough, take very little time of either student or instructor. The burden of time is shifted from the shoulders of officers afloat to those of the editor of the course. The preparation of this material means a very great deal of work, since it is necessary to so design each question that it has only one correct answer, which can be indicated by a single word, or even a check mark. The forms of questions used are similar to those in some of the psychological tests. The introduction of questions of this type into examination work greatly reduces the labor of marking, enables different examiners to arrive at the same mark, compels exact answers, and permits in a given time a much more complete sampling of a man's knowledge than does the traditional system. At the same time the mark a man gets does not depend upon his ability to express himself, or upon the examiner's variable judgment. Naturally, to be both fair and effective, such material must be very carefully prepared, but if the results fulfill expectations they will more than compensate for the labor involved.

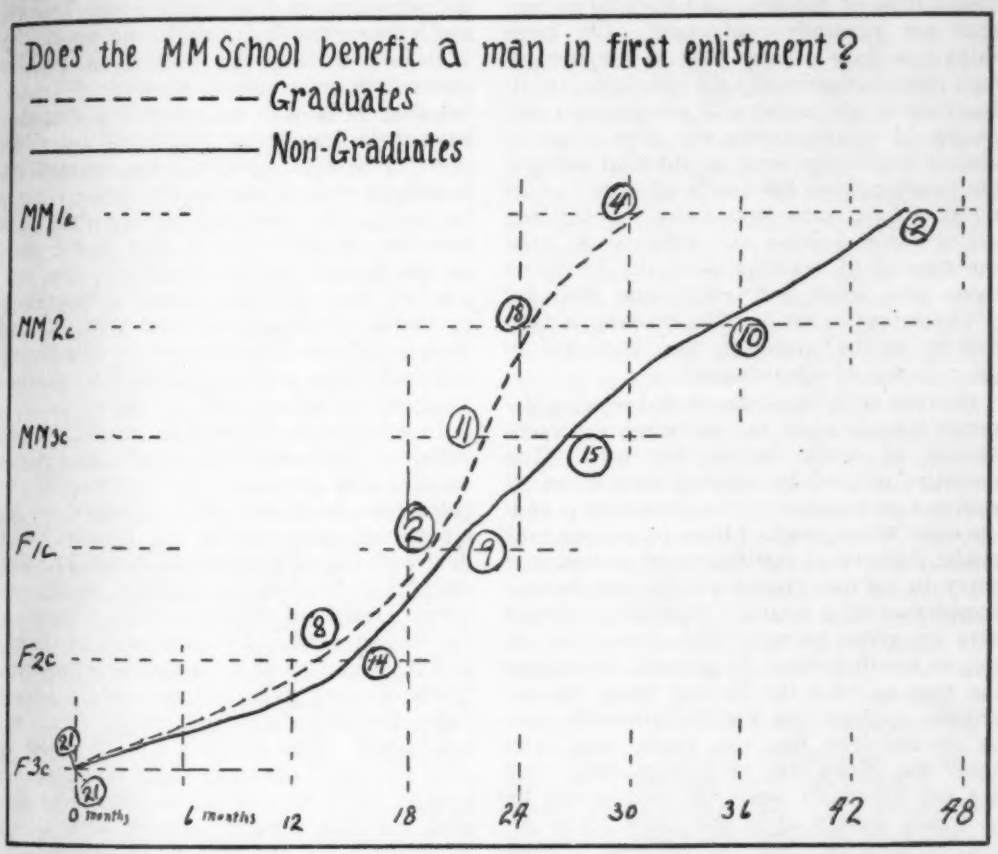

FIG. 5. This graph shows the results obtained by twenty-one starters toward the goal of machinist's mate who attended the Machinist's Mates' School, and twenty-one who did not. Note that, in first enlistment, four graduates attained a first-class rating in an average of thirty months, while only two non-graduates attained the same goal, averaging forty-six months.

Orders of the commander in chief, U. S. Fleet and of the commander in chief, Asiatic Fleet, now require that completion of appropriate courses shall be a requirement for advancement in rating. Aside from this, generally speaking, study is voluntary. However, occasionally a ship requires all men to complete appropriate courses. On some ships, men found not qualified for

the rating they hold are required to complete them within a given time or be disrated. Generally, men being coached for advancement are required to take them. As an incentive for completing courses, selection of men for advancement is frequently made competitive and their completion is one factor in the competition.

In administering courses on board ship, distribution of material and keeping of records are generally centralized. On large ships this duty usually falls to the navigator's office; occasionally the chaplain does it. Instruction and marking of assignments and giving of examinations on large ships is almost invariably done by division officers. On smaller ships the heads of departments do it. With rare exceptions the training organization follows the military, so that the control of training is in the hands of those who select and recommend men for advancement in rating. The training is thus tied up to the work the man does and to his prospect of advancement.

Success with any educational system depends largely upon the incentive for completion of work before the men. The incentive offered by making completion of course a prerequisite to advancement is now the most widespread. Other incentives are: public delivery of certificates of attainment; entry in service record of the satisfactory completion of a course. Special privileges may be given to men who earn them in this as in other ways. In general, the higher the type of man the further away the incentive may be, but for beginners it must be remembered that the young men who enter the Navy are very immature, they are not lovers of study or they would be in school instead of in the Navy. The incentive must be close and concrete if they are to progress to the full measure of their ability. Such men, oftentimes, are glad to advance, even though they fully recognize that it must be done under compulsion. It is a common mistake to assume that a man can carry a course of study through to completion merely because he wants to. His power of application must be aided until it grows to where it can take care of itself. Let him start the course voluntarily, but once started make him turn his work in regularly until he finishes it. When an assignment is due at noon Wednesday it will likely be done. When it is due "as soon as possible", you'll be lucky if you ever get it. That is true of highly trained officers; how much more true it is of men who lack their advantages. It does not do to assume that these men are masters of their own destiny and capable of carrying through a program merely because they want to carry it through. They must be assisted through any program such as this by organization and supervision, however much they may desire to do the work.

Before leaving the subject of training courses, in order not to leave any misapprehension, it is well to remember that they have their limitations. The texts themselves are not perfect; and besides no man can become a skilled man in his rating entirely by study. He must practice his trade. The practice of his trade in fact is the more necessary part of his training. The purpose of study and of formal instruction is to enable him to do so more efficiently and with better intelligence and to add knowledge which he could not obtain by practice alone in an ordinary naval career.

In addition to the courses which are provided by the bureau, visual educational material is also provided. Certain moving pictures have been especially prepared for instructional purposes in the Navy. These deal with the subjects of oil-burning boilers, electricity, Norfolk gas engines, turbine engines, Deisel oil engines, radio telephones, the audion, electrical transmission of speech, and resuscitation of the apparently drowned. These moving pictures have certain advantages for educational purposes. They are interesting. The pictures may be posed by men who are experts in their subjects. Of course, those who advocate slide films suggest that the moving picture with all its advantages has the disadvantage that anything so easy to learn is as easy to lose.

The moving pictures have certain other disadvantages. One of these is that on board ship it is difficult to show them during working hours or to selected audiences, because the only available place to show them is in the open air at the regular movie place at the regular movie time. Another disadvantage of these films is that they cost so much to produce that it is not possible to provide any wide variety of them.

These disadvantages of the moving picture are somewhat met by the slide films. These are new in the Navy; in fact, the

only ones that have been distributed are certain sample films which were sent out to ten different naval activities to find out whether they liked the idea. They all did like them and films of this kind are now being produced. The slide films are a cross between the old-fashioned stereopticon and the modern moving picture. There is a convenient projector which can be plugged into any light socket and can project a picture anywhere from eight to seventy feet on any convenient flat surface; and the smaller pictures do not require a dark room.

These slide films are shown as still pictures, not moving. Each picture can be on display as long as one likes; a group can discuss it, argue about it, compare it with the actual object, test the statements made about it; in other words make all the use they like of it before turning to the next picture. In this way, the best practice on any subject can be presented very readily to selected groups of men. These projectors cost about $35 or $40 and once the negative is made a print can be obtained for about $1.00. Hence, ships can be provided with a projector and as large a library of prints of films as they like at a reasonable cost and these films can be kept and used time after time. The subjects that can be covered are almost unlimited.

Slide films are used by such commercial establishments as the Cadillac Company, which sends a new film out every two weeks to service stations to train men in servicing their product. For example, there is one on the Cadillac brake system, and another on their noiseless gear shift. Chevrolet sends one around every two weeks to their sales stations to train salesmen. And similarly, the Navy is preparing such films on the subject of water-tight integrity, stability and damage control, correct uniform, overhauling and timing aircraft motors, resuscitation of the apparently drowned, and numerous other subjects. The first of these films has already been produced.

Officers throughout the service can be of great help in carrying on this program. Every time they develop in the course of their duties on board ship an especially good way of doing something which is done frequently in the fleet, if they will prepare a scenario on the subject similar to those which will be found in slide films and send it to the Bureau of Navigation, in due course of time they may expect to find that best practice made available for the fleet. At present the champion five-inch gun division officer in the fleet is preparing one on the five-inch gun drill.

Mention has been made of the training courses, of the educational movies, and of the slide films. In addition to these aids to training on board ship, the bureau also carries on institutions ashore for the purpose of assisting the training of the fleet. The first of these are the training stations. The mission assigned to the training stations includes qualifying recruits in boats under oars, infantry, swimming, and looking out for themselves under ship conditions. In addition to this, training stations are beginning to classify men as to their adaptability for future training. Thus, San Diego gives all recruits a number of tests and puts the results in their records. The meaning of these tests is gradually being worked out and disseminated through the service, so that officers may utilize them in assigning men to various kinds of work. The first use of these tests is to determine which men are suitable for given schools. The result of careful study of this subject within the last year has reduced the number of losses due to failure at class "A" service schools so that there are 350 less failures per year at the present rate than at the rate which obtained a year ago. This shows that we are getting to schools the men who can profit from them and that those who cannot profit go out to the fleet and are put to work for which they are more fit.

From the training stations about three-fourths of the men go direct to ships. The others go to certain class "A" schools, being those which are designed to introduce recruits to a trade, such as the machinist's mates' school and the radio operators' school. Recently, recruits have also been sent to a special routine of training for the purpose of selecting some for aviation pilots. These are selected first at the training stations; then take a short elimination course at the Naval Air Station at San Diego or Hampton Roads; then the aviation general utility course at Great Lakes; and finally a year on the *Lexington* or *Saratoga*. During the last half of this latter year those who are recommended are eligible to fill the quota for training at Pensacola.

In addition to the class "'A" schools for

recruits, there are three classes of schools for advanced men. The candidates for these schools come from the fleet. The class "B" schools perfect men in certain parts of their rating requirements not readily carried on at sea; class "C" schools train men in special activities, such as deep diving; the Naval Academy prep schools are class "C." Class "D" schools provide occasional training, such as in gas masks or motion-picture projection. Gas chambers are maintained at the principal navy yards and classes of enlisted men are sent annually to Edgewood to insure that there will always be in the fleet a supply of petty officers qualified to carry out the various phases of instruction.

One of the difficulties at the schools is that men come there ill-prepared to carry on the work. As a result, some men fail because they are unable to do the work, while for other men the school course must be lengthened to teach them what they should have known before they entered. The Bureau of Navigation Manual calls for elementary knowledge of arithmetic and English, and it is surprising how extremely elementary the knowledge of some of these men is. In fact, schools whose requirements are quite elementary in many cases have to put a considerable time on ordinary arithmetic before they can go ahead with the proper work of the course. Ships find it difficult to comply with elaborate entrance requirements for schools. However, something must be done to save the loss from sending unqualified men.

Recently, the requirement has been established that yeomen who go to the stenography school must have completed the first ten lessons of the bureau's course. This means that they must have completed the kindergarten of stenography. Any yeoman can do this without aid on board ship if he wants to. In this way the stenography school can better serve its purpose, which is to bring up the men to a satisfactory degree of proficiency. Without this, they cannot succeed in making reasonably useful stenographers in the time available. Similar action is being extended to other schools.

All officers from time to time will have the opportunity to help in dealing with this situation. They will have calls for quotas of men to go to school and will be hard put to it to find men they are willing to let go and who are at the same time qualified. They should bear in mind when this problem arises that it is going to cost them and the service more to send a poor man than to send a good one and that, moreover, in all probability if they send a man who is not qualified he will come back and they will have to send a good man, anyway.

The service afloat has to pass on candidates for the Naval Academy prep schools. This is a very important function since it is only by our overkindness or overenthusiasm that unfit men can get by. The enlisted candidates form the only large group of future officers whose opportunity for admission we can fully and wholly control. That opportunity should be used to insure that no unfit men get started. Examinations will take care of their bodily and mental qualifications, but their officers must pass on their personal fitness.

Another feature of the preparation of training material and of entrance requirements and classification methods is the relation that these activities bear to expansion in case of war. Some readers will remember how ratings were distributed to men enlisted during the last war. I remember crossing the Jamestown ferry where I heard two men who were headed for the training station to enlist, discussing what they would be; their conversation was to the effect that inasmuch as you could be a chief petty officer by asking for it, why not ask for it? That is how many of the men got their ratings during that war. We would not have to do that now. Although our means are still very elementary, we could establish schools with a sound curriculum; and we could select suitable candidates for special training with some degree of efficiency.

To conclude: the Training Division of the Bureau of Navigation can help the fleet just so far as the fleet helps the Training Division and no further. As the fleet makes known its wants in the way of training material, the Training Division attempts to provide it; but only with their help can it be made adequate. The success of the division is entirely dependent on fleet coöperation; it is entirely and completely at the service of the fleet, and its measure of performance is entirely a measure of the service which it renders to the fleet.

International Newsreel

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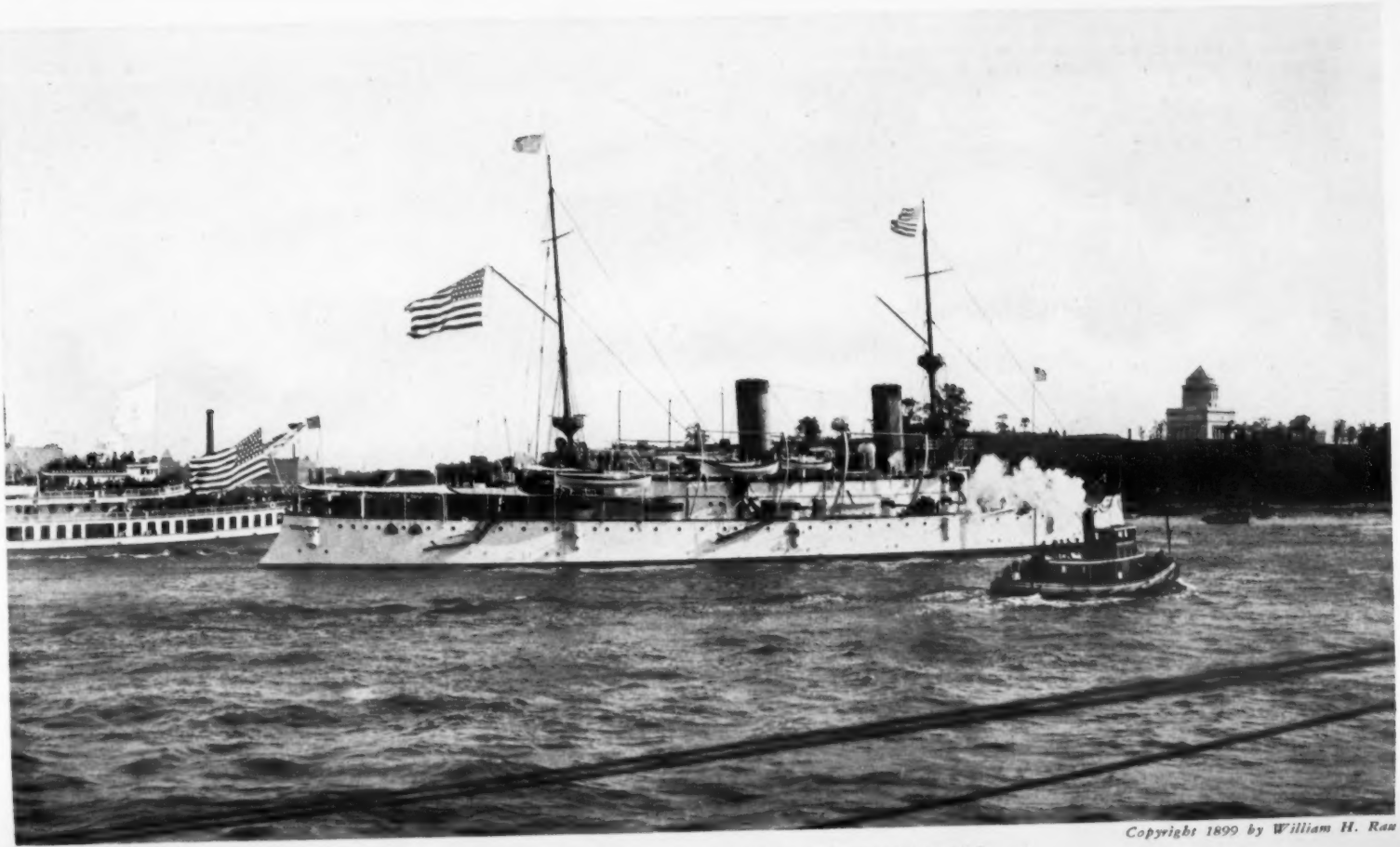
THIRTY YEARS AGO

The U.S.S. *Olympia* leading the naval parade into New York after the Spanish American War, September 30, 1899.



International Newsreel

U.S.S. *OLYMPIA* PASSING GRANT'S TOMB, THIRTY YEARS AGO

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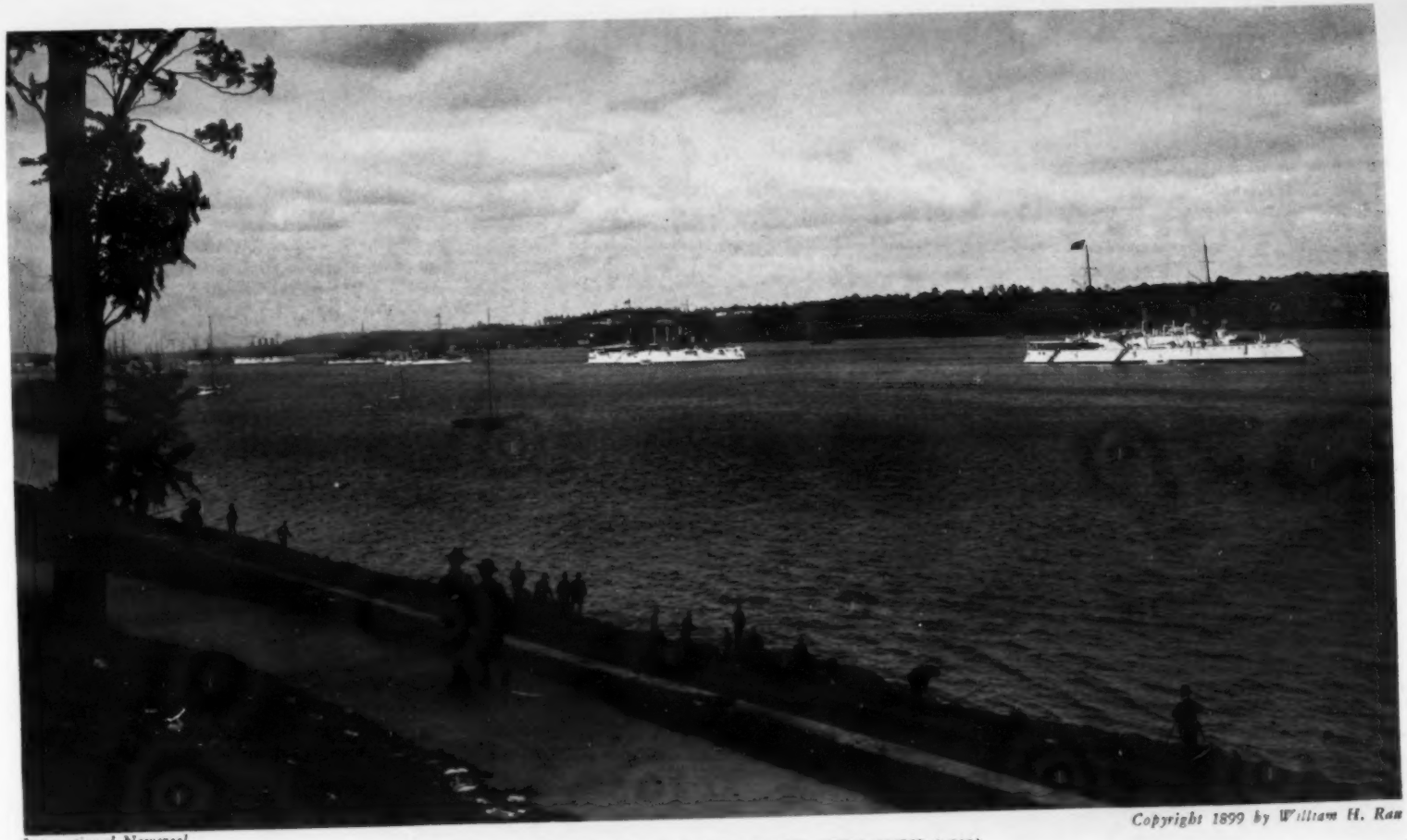

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FLEET AT ANCHOR OFF RIVERSIDE DRIVE, NEW YORK (1899)

From right to left: *Olympia, New York, Indiana, Massachusetts,* and *Brooklyn.*

International Newsreel

ADMIRAL DEWEY RECEIVING DISTINGUISHED VISITORS ABOARD HIS FLAGSHIP, THE *OLYMPIA*

International Newsreel

ADMIRAL DEWEY RECEIVING DISTINGUISHED VISITORS ABOARD HIS FLAGSHIP, THE *OLYMPIA*

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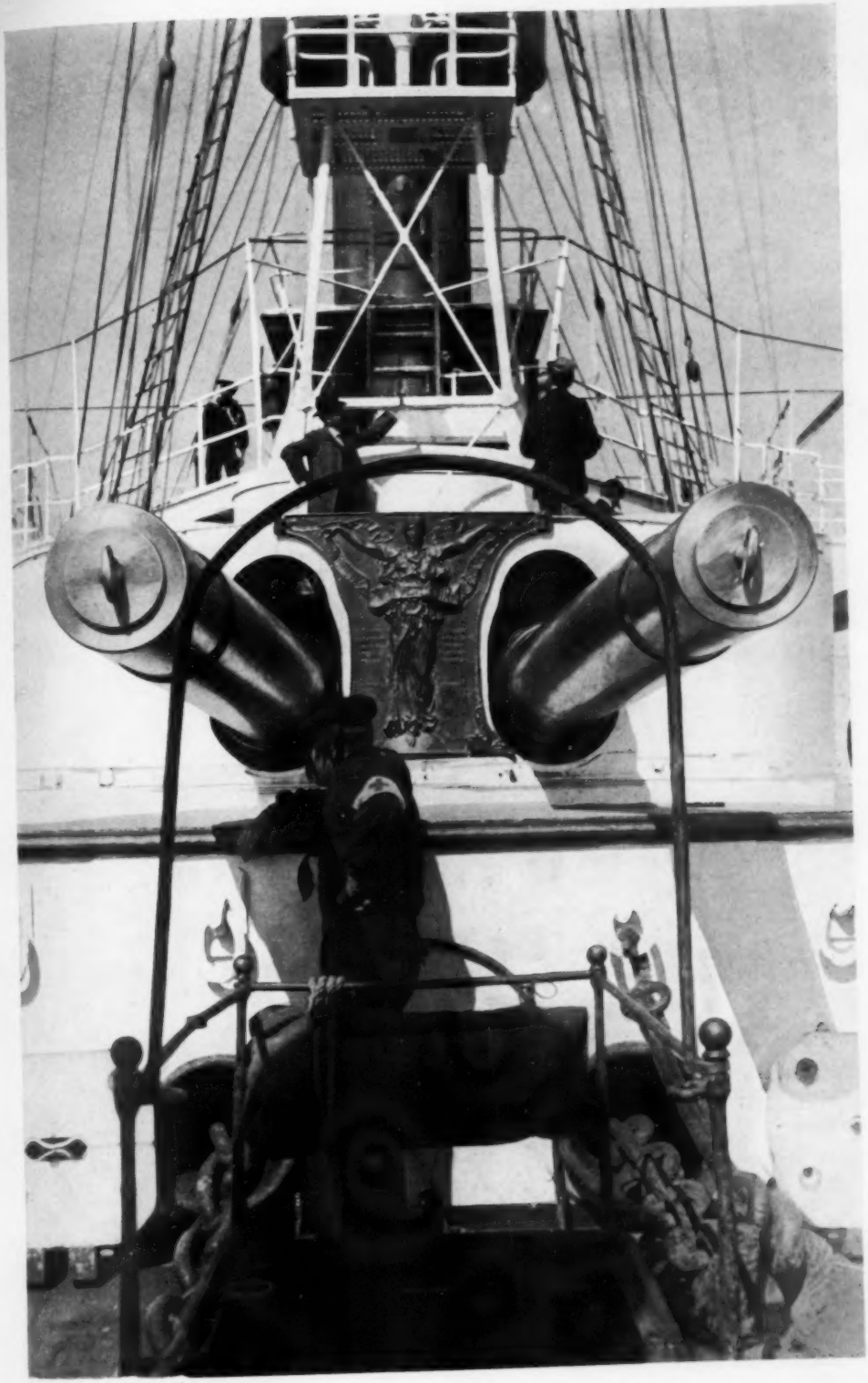
DEWEY ARCH

Erected in New York, as part of the celebration.

International Newsreel

MARINES AND BLUEJACKETS OF THE U.S.S. *OLYMPIA* PASSING THROUGH DEWEY ARCH



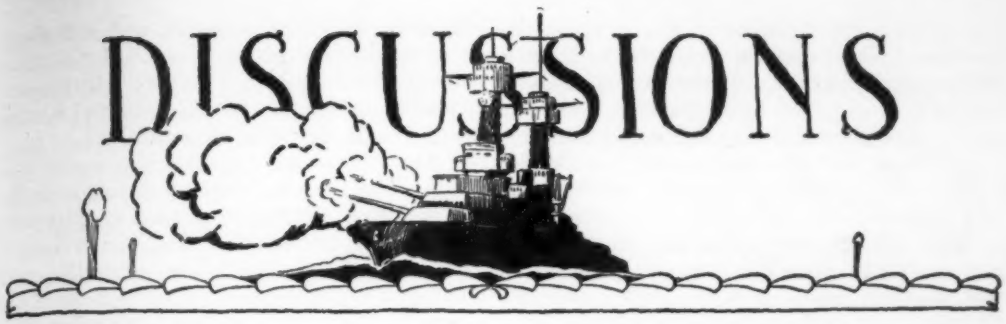
International Newsreel

BRONZE TABLET ON THE *OLYMPIA* BEARING THE WORDS,
"GRIDLEY, YOU MAY FIRE WHEN READY"

International Newsreel

PRESIDENT McKINLEY AND ADMIRAL DEWEY AT THE CAPITOL, WASHINGTON, D.C.

DISCUSSIONS



Faulty Communications

(See page 89, February, 1929, PROCEEDINGS)

COMMANDER C. C. GILL, *U.S. Navy*—I have read with keen appreciation Lieutenant Commander Sidney Ballou's excellent article on "Faulty Communications" published in the February issue of the United States Naval Institute PROCEEDINGS.

In the escape of the *Goeben* and *Breslau*, the rôle of the four British armored cruisers commanded by Admiral Troubridge has a special interest for naval officers.

GOEBEN AND BRESLAU EVADE BRITISH FORCES

When the *Goeben* and *Breslau* left Messina at 5:00 P.M., August 6, the disposition of the British forces was as follows:

(a) Two battle cruisers (*Inflexible* and *Indefatigable*)
Two light cruisers (*Weymouth* and *Chatham*)
Three destroyers

This group was northwest of Sicily.

NOTE: *Inflexible* and *Weymouth* had sailed from Malta on August 3; both had been doing patrol duty at moderate speed and, considering the time at sea, had not expended much fuel. *Indefatigable* had been at sea since August 2; during the night of August 3-4 she had steamed at twenty-two knots, and on the fourth had increased to full speed during the chase; therefore, she did not have much fuel on board. The *Chatham* and three destroyers had been ordered to Bizerta the day before to fill their bunkers, and had recently rejoined the flagship.

(b) One battle cruiser (*Indomitable*), was engaged in refueling and making repairs.

NOTE: This ship had been twenty-four hours in Bizerta but, due to difficulty in obtaining the desired quality of coal, still required two or three hours to replete. She was also in need of repairs and later went to Malta. "In pursuing the German ships at full speed on August 4 there occurred boiler defects in *Indomitable* which made it necessary for her to spend twelve hours in Malta." (Quoted from book written by Admiral Milne).

(c) One light cruiser (*Dublin*)
Two destroyers

NOTE: This group had sailed from Malta at 2:00 P.M. August 5 to join Admiral Troubridge and were filled with coal.

(d) Four armoured cruisers (*Defense, Black Prince, Duke of Edinburgh, Warrior*); this group was on watch off the mouth of the Adriatic.

NOTE: This force (except *Black Prince*, which rejoined on August 4) had sailed from Malta on August 2; the armored cruisers were ships of good radius and had not done hard steaming, so were well supplied with fuel; the destroyers were short of fuel and, in order to economize coal so as to have enough to execute an attack, they had been sent to a port in the Ionian Islands to anchor.

(e) One light cruiser (*Gloucester*); this ship was observing off the south entrance to the Messina Strait. She had been at sea since August 2, but still had on board sufficient fuel to conduct a chase as far as the Aegean.

(f) One destroyer, remaining in vicinity of Malta.

In this phase of the chase the problem that confronted the British Mediterranean Fleet and the steps taken to solve it merit close

attention. At the time of the German departure from Messina, the British dispositions guarded two avenues of escape; three battle cruisers, two light cruisers, and four destroyers were covering the western routes, while four armored cruisers with eight destroyers blocked the passage to the north for the Adriatic.

This left the way to the east open except for one light cruiser, *Gloucester,* on watch off Messina, and one light cruiser and two destroyers that happened to be en route from Malta to Otranto. It should be understood that these dispositions provided no effective barrier between the German squadron and their objective port, Constantinople. Had Admiral Souchon known it, he could have left port without anxiety and proceeded on his way.

In some quarters, a correct appreciation of this situation has been confused by the fact that the force under command of Admiral Troubridge was in a geographical position that, by chart navigation, made it possible for his slower and older vessels to intercept the *Goeben's* route to the east. His orders, however, would appear to have prohibited any such maneuver. They were, very properly, to cover the more likely avenue of escape to the Adriatic. The four armored cruisers were none too strong for this purpose, and their inferior speed made it impossible for them to maintain a position on interior lines to the Otranto Straits and, at the same time, to bar the way to the east. Admiral Troubridge could not have placed this force to the eastward of the *Goeben* without leaving the way open for the enemy to turn and go to the Adriatic. It is true that there remained some possibility of torpedo attacks by light cruisers and destroyers but against cruisers capable of going almost as fast as the torpedoes themselves, these offered remote chance of success. Under the British plan, therefore, it would have required the intervention of some chance circumstance to have prevented the escape of the *Goeben* and *Breslau* to Constantinople. As will be seen later on, chance occurrences were not lacking but they did not turn out in such a way as to alter the final result, safe arrival of the German squadron in Turkish waters.

At 5:00 P.M. August 6, the *Goeben* got under way and left Messina by the south exit, speed seventeen knots; the *Breslau* followed at a distance of five miles. Admiral Souchon expected a battle, and both ships had made final preparations. Berlin transmitted the following message: "His Majesty expects confidently that *Goeben* and *Breslau* will break through successfully."

At 6:00 P.M. approaching smoke was sighted to the south, which proved to be the *Gloucester.* At 6:10 P.M. the two ships were only five miles apart. The *Goeben* changed course to the east to follow the Italian coast to Cape Spartivento. At 7:15, the cape was rounded and a northerly course taken. This served as a feint to make the enemy infer that the Adriatic was the German destination and at the same time kept Italy's territorial waters close aboard in case it became necessary to seek a temporary refuge from superior forces. At nightfall, the *Breslau* increased speed and closed the *Goeben.*

The *Gloucester* (Captain W. A. Howard Kelly) trailed on the starboard quarter at short distance so as not to lose contact. Although it was moonlight, the dark background of the coast made it difficult for the British lookouts to see the *Goeben,* and at 8:00 P.M. Captain Kelly circled to an inshore position. For a time the *Gloucester* was inside the six-mile limit bounding Italian waters. This was contrary to Admiralty orders, but did not constitute a violation of neutrality.

A little later the *Breslau* altered course toward land and pinched the *Gloucester* for sea room so that she had to fall astern. Then the *Breslau* turned to the eastward to cross the *Gloucester's* bow and the latter vessel turned to meet her; the two ships passed starboard to starboard, at a range of about 4,000 yards. These maneuvers took place in Italian territorial waters and neither side opened fire. The *Breslau* disappeared to scout to the east-southeast. As no enemy was reported in this direction, the *Goeben,* at 11:00 P.M., when off the Gulf of Squillace, made a wide turn to the southest and shaped course for Cape Matapan and the Dardanelles.

Up to this time the German admiral had made no attempt to interfere with the transmission of the *Gloucester's* radio reports. Now, however, the German operators tried to "jam" the British messages. It was hoped in this way that the news of the change of course would be withheld, or at least delayed. The attempt was not successful.

During the night, Admiral Souchon con-

tinued toward Matapan at a speed of sixteen knots. The *Breslau* took a screening position to the southward. The *Gloucester* trailed at short distance on the quarter of the *Goeben,* and transmitted at regular intervals to Admiral Troubridge and other British ships reports of the *Goeben's* movements.

Admiral Milne was too far away to join immediately in the chase. As he had been forbidden to pass through the Strait of Messina, he proceeded to round Sicily to the west. When off Marittimo Island, a message was received from the Admiralty that authorized the British to follow the *Goeben* through the strait, but it was too late to be of benefit as by this time the westerly detour had been completed.

When the *Goeben* came out, Admiral Troubridge, with four armored cruisers, was patrolling off Cephalonia. The eight destroyers under his command were short of coal and had been sent into Santa Maura to economize fuel. As the reported enemy course indicated the Adriatic as the German destination, Admiral Troubridge headed to the northeast to intercept the enemy in the narrow waters of Otranto Strait to the west of Fano Island. The destroyers were directed to move out to Vasilico Bay. When the *Gloucester* reported the *Goeben's* change of course to the southeast, Admiral Troubridge suspected that it migh be a feint. At 12:08, however, as the *Goeben* continued toward Matapan, the British commander estimated that the enemy's objective might be operations in the east against trade, or perhaps bombardments of Alexandria or Port Said, similar to those previously conducted against the Algerian ports. At 12:08, therefore, the armored cruisers were turned south and the eight destroyers were called out.

It was Admiral Troubridge's plan to endeavor to engage the *Goeben* before dawn in the hope that, under cover of darkness, he might get close enough to deliver a concentrated attack with his slower and less heavily armed vessels. As his primary purpose was to bar the way to the Adriatic and as the *Goeben* might at any moment head in that direction, the execution of this plan was rendered extremely difficult; had Admiral Troubridge led his force to the eastward of the *Goeben,* the avenue of escape to the Adriatic would have been left open. As the night advanced, it became increasingly evident that his only hope of forcing a night action was in case the *Goeben* made a break for the cover of the Greek coast. Admiral Souchon, however, continued on his way. At 3:51, Admiral Troubridge saw that a night action was impossible; he then changed course for Zante and prepared to resume his station on watch at the mouth of the Adriatic.

It so happened that during this night the *Dublin* (Captain John Kelly) with two destroyers were en route from Malta to join Admiral Troubridge off the entrance to the Strait of Otranto. The *Goeben's* change of course to the southeast placed this detachment in ideal position to deliver a night torpedo attack. Admiral Troubridge promptly ordered that this be done and directed *Gloucester* to guide *Dublin* in its execution.

By coincidence, two brothers were thus engaged in an adventurous enterprize for a stake as important as it was hazardous and difficult to achieve. Guided by his brother's reports from the *Gloucester,* Captain John Kelly of the *Dublin* sighted, at about midnight, smoke in the moonlight. At first it was thought the *Goeben* had been located and maneuvers were made to attack; but it proved to be the *Breslau* and search for the battle cruiser was resumed. The captain of the *Dublin* laid a course parallel to that signaled by the *Gloucester* and at high speed followed it until he was sure that he had attained a position ahead of the *Goeben.* He then moved over to the estimated track of the enemy and prepared to deliver his attack on the opposite course. The bright moonlight favored the discovery of an enemy, and, in this way, worked for both sides. It made contact more probable and the subsequent delivery of the torpedo attack more difficult; the fast *Goeben* would have more time to maneuver and to use her guns. It was a business that was sure to end one way or another in a short time, because the sum of the two speeds gave an express-train rate of approach. During this tense interval torpedo tubes and guns were manned for instant use, while lookouts keenly searched the waters ahead. Nothing was sighted; and, as the minutes passed by, it became apparent that the chance had been missed.

There seems to have been some confusion between local and Greenwich times in the interpretation of the *Gloucester's* signals; perhaps there were discrepancies in the navigational reckoning of the two ships; upon sighting the *Dublin,* the *Breslau* had made a

radical change of course and had reported the presence of the British light cruiser to the *Goeben*, and this may have aided the latter's maneuvers of evasion. Whatever the cause, contact was not made, and the *Dublin*, with destroyers, resumed a northerly course to carry out the original orders to join the division of armored cruisers.

Gloucester was left to carry on the chase alone. At any time, had the *Goeben* wished to take the time and expend the necessary fuel, she could have suddenly turned on the British cruiser at full speed and probably overtaken and destroyed her. Mindful of these circumstances, Admiral Milne became anxious for the *Gloucester's* safety, and at about 5:30 A.M. signaled Captain Kelly to drop astern to avoid destruction; but the latter took the signal as permissive only, and continued to trail doggedly. At 6:00 A.M., the *Goeben* increased speed to twenty knots and the *Gloucester* did likewise. By 10:30 A.M. the *Breslau* had rejoined. At noon the three ships were about twenty miles southwest of Navarin.

Admiral Souchon finally became concerned about the presence of this enemy cruiser reporting his every move to the British fleet; he decided to take steps to shake off his persistent companion. The *Goeben* increased speed to twenty-five knots and the *Breslau* was directed to fall astern in order to ride off the *Gloucester*. In this way it was hoped that the latter could be outdistanced and lost amongst the islands of the Grecian archipelago.

This was the prelude to the only shots exchanged throughout this unique campaign. While the *Goeben* speeded ahead, the *Breslau* dropped back, maneuvering ahead of the *Gloucester* from one side to the other as though engaged in sowing mines along her track. Captain Kelly saw that something had to be done or he would soon lose sight of the *Goeben*. He decided to engage the *Breslau*.

At 1:35 P.M., the *Gloucester* opened fire with her bow 6-inch gun on the *Breslau*, distant 11,500 yards and bearings two points on the port bow. The latter maneuvered to bring her starboard battery to bear and returned the fire. The *Gloucester* closed to 10,000 yards at full speed and then executed a wide ten-point turn to port that brought the *Breslau* on the starboard quarter. In the meanwhile, Admiral Souchon had observed the two ships in action and had decided to go to the assistance of his consort. He knew the British counted two 6-inch and seven 5-inch against the *Breslau's* twelve 4.2-inch. The *Goeben*, therefore, countermarched and, though still out of range opened fire. Captain Kelly, having accomplished his purpose, ceased firing at 1:50 P.M. and withdrew. The German cruisers then reverted to their easterly course, and the *Gloucester* continued to track and report their movements.

No serious damage was done to either light cruiser during this short action. The *Gloucester* received a hit that put one gun out of action and killed a few men, while the *Breslau* escaped with a hole in her hull.

The change from the amenities of peace to the hostilities of war had been particularly abrupt for these two ships. During the previous week they had been at anchor together in the harbor of Durazzo; there the crews had engaged in a friendly match of water polo, and in the social intercourse between the wardrooms an officer of the *Gloucester* had met a German brother-in-law attached to the *Breslau*. From competition in sport to serious rivalry in war is a wide step. Both ships would have now welcomed an opportunity to fight it out; but this was not to be. Admiral Souchon had already interrupted the action on the German side, and it was not long before Admiral Milne placed a restraining hand upon Captain Kelly.

The British commander in chief was still at Malta. He knew the *Gloucester* was running short of fuel, and, therefore, ordered her not to chase farther than Cape Matapan. By 4:40 P.M. this limit had been reached; here Captain Kelly stopped; he watched the *Goeben* and *Breslau* continue eastwards through the Corvi Channel and out of sight. With this last report of enemy movements, the *Gloucester* turned back to rejoin Admiral Troubridge's flag.

Discussion

As has been said, the British plan aimed to intercept the *Goeben* and *Breslau* if they went to the west or to the Adriatic; there was no provision to bring them to action if they went to east; therefore, unless some chance circumstance intervened, their escape was a foregone conclusion as soon as Admiral Souchon decided to go to Constantinople. A correct appreciation of the British plan should not be obscured by the fact that two

chance circumstances did intervene; one of those was the torpedo attack attempted by the *Dublin* and two destroyers; the other was the offensive movement initiated by Admiral Troubridge that aimed to engage the enemy in a night battle. The position of the *Dublin* detachment was fortuitous and only incidental to the British plan; the movement initiated by the armored cruisers to intercept the enemy during the night also was not contemplated in the plan; on the contrary, had Admiral Troubridge continued it and placed his ships to the eastward in position to intercept *Goeben* he would have violated the British plan and left open the avenue of escape to the Adriatic. In both of these chance opportunities the odds were much in favor of the Germans and it is not surprising that no British success was scored.

In war fortune has always entered as a factor; but the plan of campaign, the strategy and tactics used, has, in most instances, dominated the issue. The odds are always on the side that is in good position to profit by chance opportunities. In the beginning of this phase, the British were favored by fortune; the *Goeben* proceeded at moderate speed, and the *Gloucester* was allowed continuously to report her movements; but it would have taken an unusual stroke of luck to have stopped the German cruisers on their easterly course.

The British plan was defensive. This left the initiative in the hands of the enemy, and, as not infrequently has happened in past wars under similar circumstances, the enemy did the unexpected thing; instead of heading for a British concentration he went to the east. In this unforeseen contingency, there were no provisions in the British plan that could have reasonably been expected to prevent him from attaining his objective.

The tactics employed by Admiral Troubridge have received much prominence. As has been pointed out, *per se*, they were in the main logical enough. His orders were to bar the way to the Adriatic and, to do this, he had to keep his slower force on interior lines between the enemy and the entrance to that sea. Notwithstanding this, he has been severely criticised for not attempting to head off the enemy on the easterly route. For his conduct on this occasion, he was subjected to trial by naval court-martial, and was "fully and honorably" acquitted.

Even had he abandoned his primary task, to bar the way to the Adriatic, and gone to the westward to intercept the enemy, he would probably have had difficulty trying to concentrate his four 21-knot armored cruisers on the 25-knot *Goeben*. In daytime had he separated his cruisers to effect an enveloping movement, then the more powerful *Goeben*, supported by *Breslau*, steaming at full speed could have broken through the weakest point, either overwhelming or brushing aside the lighter opposing vessels before the more distant units could arrive to their support; had he kept his cruisers concentrated, then the faster *Goeben* could have taken as much or as little of the engagement as the German admiral chose. Admiral Troubridge could probably have compelled the enemy to make a detour to get around his concentrated force but it is extremely doubtful if he could have brought the *Goeben* to an effective action.

In decreased visibility, either in moonlight or twilight, the same considerations apply; but chance would then have entered to a greater extent; shorter ranges would have favored the British; and also the more numerous British torpedoes would have had more likelihood of scoring a hit. On the whole, however, day or night, in the open sea, the British armored cruisers were at a tactical disadvantage that would have rendered a successful concentration on the *Goeben* extremely problematical. In narrow waters the situation would have been very different as the speed disadvantage would have been eliminated, or at least greatly ameliorated, and the advantage of superior numbers would have been augmented. This British force concentrated in the Strait of Otranto would have presented to the *Goeben* a serious obstacle by day or by night.

In the contemplation of Admiral Troubridge's tactics, moreover, sight should not be lost of the possibility that Admiral Souchon might have turned at any time and made a break for the Adriatic; had his course for Matapan been a feint, had Admiral Troubridge drawn his forces to the eastward to intercept him and then had the *Goeben* turned and escaped unobstructed to the Adriatic, it is doubtful if the British commander would have been subsequently "fully and honorably" acquitted by a naval court-martial.

Whether or not something more might have been attempted by torpedo craft is

another question. It would appear that because of coal shortage the eight destroyers were not in shape to undertake any operation that required considerable steaming at high speed; that they should have been in this condition may well be criticised; but even if they had had the fuel and had gone out to deliver a night attack, there is no assurance that they would have been able to do better than the *Dublin* and the two destroyers with her. The imagination is apt to frame a picture much more favorable to the destroyers than is warranted by experience gained both in peace and in war. On this very night the *Dublin* episode supplies a balancing check to this tendency. On the night of the Jutland battle, nearly two years later, faster and better destroyers had a number of opportunities to attack groups of battleships moving at a speed of only fourteen knots, and only one success against the German predreadnaught *Pommern* was scored; if this is taken as a criterion, the eight smaller and slower boats attached to Admiral Troubridge's flag would not have had much chance of torpedoing on a moonlight night the 25-knot *Goeben*.

Attention is invited to these points that they may aid in a correct estimate of the tactical situation under discussion, but it is not intended to suggest that it would not have been worth while to have attempted a night torpedo attack against *Goeben*. It is a principle of war that no chance, however slight, to destroy the enemy should ever be neglected. It would appear, therefore, that the unreadiness of the eight destroyers and the consequent fact that they did not attempt a night attack constituted a violation of this principle.

In connection with Admiral Troubridge's tactics one other important question has been raised; in the official history by Corbett and also in the authoritative work by Winston Churchill it has been indicated that in the application of the Admiralty instructions, "do not at this stage be brought to action against superior forces," Admiral Troubridge would have considered in daylight the force under his command as inferior in strength to the German squadron. The inference to be drawn is that had Admiral Souchon sought a day action against Admiral Troubridge, the latter would have tried to avoid it. Whether or not Admiral Troubridge has been correctly interpreted in this matter is not known. The situation did not arise, so discussion of it is purely academic. Taken in the abstract, however, such a point of view is difficult to understand. It is true that the *Goeben's* guns outranged those of the British ships and if, by her superior speed, she could have maintained distance just outside the enemy's effective range, she might have damaged the British armored cruisers without being hurt in return. But, to say nothing of the precise maneuvering required, what of the ammunition needed to sink her four adversaries at this extreme range? In the Falkland Island battle two British battle cruisers used nearly three-fourths of their ammunition to sink two German armored cruisers. And also, what would the two light cruisers and ten destroyers have been doing all this time? With the *Goeben* handicapped by a gun action opportunity might have been found to score a torpedo hit, and even without a hit the torpedo menace would probably have prevented the exact maneuvers necessary to maintain the German range desired. It is obvious that the basis of the point of view that the German force was superior is theoretical rather than practical.

In making a comparison of the strength of one force against that of another, all contingent circumstances must be considered. For example, professional opinion might be found in general agreement that the force under Admiral Troubridge was inadequate to assure the destruction of the fleeing *Goeben* in the open sea by enveloping maneuvers; also, that it was inadequate to bar the way to the Adriatic and, at the same time, to bar the way to the east; but the same opinion might still be in perfect accord that this force concentrated in the narrow waters of the Otranto Strait was adequate to prevent the passage of the German squadron to the Adriatic. Inference as to what Admiral Troubridge might have done under circumstances that did not arise should not be allowed to confuse judgment of the tactics he used in the situation actually presented.

The torpedo attack made by the *Dublin* and two destroyers, assisted by reports from the *Gloucester*, was well planned. That contact with the *Goeben* was missed must be attributed to the fortune of war. Some criticism has been offered that the *Dublin* was not ordered to join the *Gloucester*, then running short of coal, in tracking the *Goeben*.

It was not part of the British plan to conduct a vigorous chase to the eastward, and the information that the *Dublin* might have gained by assisting and later relieving the *Gloucester* was evidently not considered worth the risk involved.

On the German side, the tactics used by Admiral Souchon during the night of August 6-7, by which the *Gloucester* was allowed to trail and make reports while the *Goeben* proceeded at moderate speed, are hard to understand. Before changing course for Matapan, had a determined effort been made to shake off the *Gloucester*, then the feint to the north along the coast of Italy might have served a useful purpose; as it was, the *Goeben* lost time and distance and no commensurate benefit was gained. It is known that the German Navy was skilled in the devices that make night firing effective, and it is probable that in the moonlight, it would not have taken the *Goeben* long to have disposed of the *Gloucester*. There seems to be no explanation for these passive German tactics that would have favored the execution of any enemy offensive plan.

The dilatory tactics of Admiral Souchon and his indifference to the presence of the *Gloucester* would have allowed the British battle cruisers to have intercepted his route had they been as far away as Malta at the time of the German departure from Messina. The German speed of sixteen knots would have permitted the British to gain six miles an hour, and to this was to be added the time lost by the *Goeben* in maneuvering to the north. Even had Admiral Milne been to the west of Messina, off the north entrance to the Strait, he would have had time to chase through this passage and overtake the *Goeben* by daylight. It might logically have been assumed that the restriction not to pass within six miles of the Italian shores did not apply in the special circumstances that had arisen; after allowing the German cruisers to coal in one of her ports, Italy could never have objected to the passage of the British cruisers through the strait. It is evident, therefore, that any aggressive plan which would have brought the British battle cruisers close to Messina, in readiness to chase, might easily have resulted in a tactical situation dangerous for the *Goeben*. At dawn on August 7, had Admiral Troubridge been closing from the north and Admiral Milne from the south, with destroyers and light cruisers both to the east and the west, Admiral Souchon, in all probability, would never have reached Constantinople. It was the *Goeben's* luck that the British plan was defensive and not offensive.

The Speed of Battleships

(See page 273, April, 1929, PROCEEDINGS.)

CAPTAIN A. M. PROCTER, *U. S. Navy (Retired)*.—The prize essay by Lieutenant Percival is an interesting discussion of an intricate subject. The general conclusion that there has been a tendency to exaggerate the advantage of speed is undoubtedly sound. In his treatment of the specific problem of battleship speed, however, he has, I believe, failed to correctly evaluate the factors involved.

In the closing paragraph, he suggests a speed of fifteen to seventeen knots. On page 278 he gives figures for the saving due to a reduction in speed from twenty-three to nineteen knots which cannot be accepted, in view of evidence which is available. Lieutenant Percival estimates that a weight of 1,925 tons can be saved from the engineering weights by this reduction.

Mr. James L. Bates, of the Bureau of C. & R., in a discussion before the Society of Naval Architects and Marine Engineers, published in the PROCEEDINGS for 1927, has given the engineering weights for a 53,000-S.H.P. steam turbine installation at 2,800 tons.

Mr. Bates does not state what the speed will be, but by using the published data for the *Mutso* and the *Nelson*, which have a speed of twenty-three knots, it is possible to construct a power curve sufficiently accurate for the purposes of this discussion.

The powers for speeds between seventeen and twenty-five knots will be as follows:

Speed, knots	*S.H.P.*	*%*
17	14,000	44
19	22,500	70
21	32,000	100
23	45,000	141
25	64,000	200

In considering the effect of reduced power it is well to remember that what are known as engineering weights are made up of two parts.

The first is the weight of the propulsive machinery and the second is the weight of ship's auxiliaries, including all electrical weights under the Bureau of Engineering.

The first factor may be assumed to vary directly as the power. The second factor, which depends on the size and gun power of the ship, will not vary with the engine power but will remain fixed.

In a 35,000-ton ship this fixed weight may be taken at 800 tons which, for 53,000 S.H.P., leaves 2,000 tons for the weight of the propulsive machinery.

Applying the ratio 32,000: 53,000, brings the propulsive weight to 1,200 tons for twenty-one knots, which will be taken as the origin from which the effect of speed changes will be computed.

The machinery weights for the various speeds will be as follows:

Speed	*Propulsive wts.*	*Fixed wts.*	*Total*
17 knots	528 tons	800 tons	1,328
19 knots	840 tons	800 tons	1,640
21 knots	1,200 tons	800 tons	2,000
23 knots	1,690 tons	800 tons	2,490
25 knots	2,400 tons	800 tons	3,200

In the discussion previously referred to, Mr. Bates gives a schedule of weights for a 35,000-ton ship. Correcting the engineering weights for the difference between 32,000 S.H.P., and 53,000 S.H.P., this schedule will be as follows:

Hull and fittings	13,000 tons
Protection	12,300 tons
Engineering	2.000 tons
Ordnance	6,650 tons
Equipment	1,050 tons
Total	35,000 tons

The effect of varying speeds on weight available for protection, or armament, follows:

Speed	*Protection*	*Gain or loss*
17	12,972 tons	+ 5.4%
19	12,660 tons	+ 2.9%
21	12,300 tons	0.0%
23	11,810 tons	— 4.0%
25	11,100 tons	—10.0%

From the above it will be evident that I have reached a very different result from that of Lieutenant Percival, who estimates that 1,925 tons can be saved from the engineering weights by reducing the speed from twenty-three to nineteen knots. The difference shown by the above table is 850 tons.

As a matter of fact the speed of our fleet, twenty-one knots, is a moderate one, adopted long before the effects of the teachings of the Fisher School began to be felt.

It comes at a point on the power curve where but slight effect on weight is produced by small speed changes, because of the small ratio of the machinery weight to the total displacement.

If powers above twenty-three knots are attempted, the price paid increases at a progressive rate, and soon becomes exorbitant.

When the speed of the battle cruisers which disappeared with such rapidity at the battle of Jutland is reached—and that of the 10,000-ton cruisers which are now the fashion—there is a different story. It is significant that the British, who are in a position to read the lessons of Jutland more clearly than any other nation, are building slower cruisers than those of any of the other Treaty powers.

In a study of the cruiser problem the results which follow have been obtained:

Speed	*Wt. of Protection*	*Gain or loss*
27 knots	1,964 tons	+29.0%
29 knots	1,787 tons	+17.0%
31 knots	1,527 tons	0.0%
33 knots	1,145 tons	—25.0%
35 knots	613 tons	—60.0%

The above figures are based on the assumption that the engineering weights for a 33-knot cruiser will be 2,055 tons.

Between thirty-three knots and twenty-nine knots the gain in weight available for better protection amounts to 692 tons, an increase of 56 per cent.

Compare this with the gain of 7 per cent in a 35,000-ton battleship, due to a decrease in speed of 4 knots, from twenty-three to nineteen knots.

In this discussion I have attempted to evaluate some of the factors which enter into the problem. It is a matter for profound study by technicians who have the necessary data upon which correct conclusions can be based. It is quite possible that valid objection may be found to a material increase beyond twenty-one knots, but below that speed it is extremely doubtful that the saving in weight will justify any decrease.

If, as is probable, future designs result in lower weights per S.H.P. the percentage of machinery weights, for any given speed, will be lowered, and the possibility of material saving greatly reduced.

PROFESSIONAL NOTES

AUGUST 2 TO AUGUST 31

LIEUTENANT COMMANDER D. B. BEARY, U. S. NAVY
LIEUTENANT COMMANDER D. C. RAMSEY, U. S. NAVY
AND
PROFESSOR HENRY BLUESTONE, U. S. NAVAL ACADEMY

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UNITED STATES

Replacement of Battleships

Washington *Post*, August 25.—Although Uncle Sam has been rejuvenating his prewar battleships since the 1922 Washington arms conference, they will begin to drop from the line in 1934 as unfit for further naval service.

Of the Nation's eighteen capital ships, thirteen are of the so-called prewar type, the oldest of which are passing the 20-year mark, considered the life of a warship.

Moderinization of the old vessels was undertaken by the Navy under the conditions of the 1922 arms treaty. This was done in an effort to make them less vulnerable from submarines and aircraft, lessons learned from naval engagements in the World War.

Replacement to Start

The replacement program as set out under the 1922 treaty, is to get underway in 1931, with two new battleships to replace the old *Florida, Utah* and *Wyoming* in 1934.

However, as the end of the ten-year arms treaty approaches and negotiations between England and the United States for further naval limitations are progressing, there is considered by naval authorities the possibility that the eighteen warships, already approaching obsolesence, may be called upon for further service.

Under the 1922 treaty, improvements to battleships are limited to 3,000 tons each. Because of the necessity of constructing protected decks to resist aircraft attacks and of adding blisters on the hulls to assure adequate protection against submarine torpedoes, the naval constructors were unable to increase the speed or the maneuverability of the old ships.

They have added new masts to the eight ships completed, however, thereby improving the fire control for the big guns, and they have brought about some increase in the range of the big rifles.

Returned to Line

The battleships *Utah* and *Florida*, begun in 1908, which were the first to undergo modernization, were returned to the line in 1926. The *Arkansas* and *Wyoming*, laid in 1909; the *New York* and *Texas*, begun in 1911, were modernized in 1927 and 1928, respectively. The *Oklahoma* and *Nevada*, begun in 1912, this month took to sea again to take their places in the line in September.

The *Pennsylvania*, which is scheduled to replace the *Texas* as flagship of the United States fleet, and the *Arizona*, begun in 1913, are now in Navy yards undergoing modernization. The *New Mexico* and *Mississippi*, fourteen-year-old ships are to be modernized next year if Congress provides the funds. It has not been definitely decided whether the *Idaho*, of the *New Mexico* type, will be modernized because she was begun in 1915, but not completed until 1919.

The youngest of the battleships are the *Colorado* and *West Virginia*, both being completed in 1923. The *Tennessee, California* and *Maryland* were begun during the war, but were not finished until 1921.

If the replacement program is carried out, the United States will have fifteen new battleships in 1942, instead of eighteen as at present.

Submarine "Lung" Gets First Full Crew Test

Special to The New York Times
August 31

New London, Connecticut, August 30.—Equipped with the "lung," the Navy's invention for rescue from submersibles, twenty-six officers and bluejackets came out of the afterhatch of the submarine *S-4*, submerged near her pier at the submarine base this morning, and swam to safety through the chill waters of the Thames River. The men who performed the escape successfully comprised the first instruction class working under actual conditions at the base.

Lieutenant C. B. Momsen, co-inventor of the "lung," and others had previously used the apparatus with success, first at Key West, Florida, and then at the submarine base, and more than 300 men from the base had practiced with the "lung" in the Y.M.C.A. swimming pool. But today's test was the first for an entire class under real conditions.

The *S-4*, which had been reconstructed for salvage experiments after being raised from a depth of 102 feet off Provincetown, Massachusetts, where it lay from December 17, 1927, till March 17, 1928, with the loss of the whole crew, was sunk with the test class at nine o'clock this morning.

The men had entered the craft in bathing suits, many of them wearing only trunks. The weather was not so good as it might

have been and the water was reported very chilly.

Communication was immediately established with the submerged vessel by means of a battery list telephone, practicaly a new apparatus, by which a person standing on the pier talked clearly with all compartments of the craft.

Fifty-one went down in the submarine planning to make their escapes, but it was deemed advisable to let twenty-six escape today and the remainder tomorrow, when the experiment will be repeated.

The "lung" consists of an oxygen bag with a cannister of soda lime. Tubes from the oxygen bag and the cannister connect with a mouthpiece which is similar to that of an army gas mask.

The "lung" is strapped about the body and neck loosely, small clips enabling the wearer to keep it in front of him. The mouthpiece has a rubber flange which goes between the inside of the lips and against the teeth and gums. Two rubber bits are grasped between the teeth. A nose clamp, though not necessary, would keep salt water from the nostrils.

Vessels Under Construction, U. S. Navy, Progress as of July 31, 1929

Type Number and Name	Contractor	Per cent of Completion				Contract date of Completion	Probable date of Completion
		August 1, 1929		July 1, 1929			
		Total	On Ship	Total	On Ship		
LIGHT CRUISERS							
Pensacola (Cl24)	New York Navy Yard	85.1	82.6	81.2	78.5	7/ 9/29	2/ 1/30
Salt Lake City (Cl25)	American Brown Boveri Elec. Corp.	95.3	95.3	93.3	93.1	7/ 9/29	10/ 9/29
Northampton (Cl26)	Beth. S. B. Corp. (Fore River)	71.1	68.4	67.1	64.5	6/13/30	6/13/30
Chester (Cl27)	American Brown Boveri Elec. Corp.	67.9	67.5	66.	65.6	6/13/30	6/13/30
Louisville (Cl28)	Puget Sound Navy Yd.	42.4	39.6	39.6	37.1	3/13/31	3/13/31
Chicago (Cl29)	Mare Island Navy Yd.	43.	38.	39.9	34.7	3/13/31	3/13/31
Houston (Cl30)	Newport News S.B. & D.D. Co.	65.3	63.	61.5	59.	6/13/30	6/13/30
Augusta (Cl31)	Newport News S.B. & D.D. Co.	51.	47.1	47.2	42.5	3/13/31	3/13/31
Cl-32	New York Navy Yard						
Cl-33	Beth. S. B. Corp. (Fore River)	Awards made but completion dates not yet fixed.					
Cl-34	Puget Sound Navy Yd.						
Cl-35	New York Shipbldg. Co.						
Cl-36	Philadelphia Navy Yd.						
FLEET SUBMARINES							
V-5 (SC1)	Portsmouth Navy Yd.	72.8	71.3	69.	67.5		3/1/30
V-6 (SC2)	Mare Island Navy Yd.	63.4	60.4	60.6	57.1		6/1/30

Authorized by Act of August 29, 1916.

12 Destroyers Nos. 348 to 359 inclusive—no funds for construction.
1 Transport No. 2—no funds for construction.
3 Fleet Submarines Nos. 169 to 171 inclusive—to be undertaken in fiscal year 1930.
1 Neff Submarine No. 108—no funds for construction.

Authorized by Act of February 13, 1929.

5 Light Cruisers—to be undertaken in fiscal year 1930.
5 Light Cruisers—to be undertaken in fiscal year 1931.
1 Aircraft Carrier—to be undertaken in fiscal year 1930.

GREAT BRITAIN

Naval Policy

London *Times*.—Replying to Lieutenant-Commander Kenworthy, Mr. MacDonald said:—I am now in a position to make a statement of the immediate intentions of the Government regarding the naval building program. The Government's general position is that the defense of a country must be devised with two main considerations in view: first, the chances of the defenses having to be used; then, the efficiency and economy shown in their magnitude and character. The Government has kept in view the changes in policy and in the problem of national security effected by the Peace Pact, if that Pact is to be made an effective influence in international relations. To make it so is the controlling purpose of the Govern-

ment, and a systematic policy is being developed, which will take a little time to complete, to carry out that intention.

As is well known, in the midst of the multifarious concerns which the formation of a new Government entails and the specially pressing and complicated nature of our tasks, conversations have been actively carried on between the United States and ourselves for the purpose of opening the way for an agreement on naval matters which hitherto have defied a settlement. By a happy coincidence our assumption of office corresponded in time with the arrival in this country of the new American Ambassador, General Dawes, who has come here charged by the President of the United States of America with a mission for preparing the ground for an International Agreement on the Reduction and Limitation of Naval Armaments. Already the whole field of these differences with the United States has been surveyed, and the two Governments have made a fresh start on their solution. We have agreed upon the principle of parity; we have agreed that, without in any way departing from the conditions of parity, a measure of elasticity can be allowed so as to meet the peace requirements of the two nations. We have determined that we shall not allow technical points to over-ride the great public issues involved in our being able to come to a settlement. And, so soon as the rising of this House releases me from its day-to-day work, I propose to make this matter my chief concern until an issue is reached. A visit to the President of the United States is now the subject of conversation so that it may take place, when it will be most helpful to promote the cordial relations of our two countries and in particular advance the ends of disarmament and peace which we hold in common. It has to be fitted in with certain international conferences, but October at present looks a likely month.

A committee to coördinate the three Services for the purposes of Cabinet consideration has been set up, but, as that coördination is not comprehensive enough to meet the requirements of State policy, the Foreign Office is also represented upon it. This will enable us to systematize our work. In the opinion of this committee, the general outlook is such as to justify a review of our own program. Our predecessors did this from time to time as the outlook brightened. Therefore, after a thorough examination of our naval position, and not only as a proof of our own sincerity but as a duty imposed upon us to guard the expenditure of national money, we have decided as follows:—

To suspend all work on the cruisers *Surrey* and *Northumberland*.

To cancel the Submarine Depot Ship *Maidstone*.

To cancel to contract submarines.

To slow down dockyard work on other naval construction.

As regards the 1929-30 program, in any event no commitments would have to be entered into before the autumn, and no steps will be taken to proceed with it until the matter has received further consideration.

The Government, of course, recognizes that a reduction in the naval building program must have a direct effect on employment in the dockyards, but I am glad to say that, as a result of special rearrangements suggested by the Admiralty, it is hoped to be able to secure the absorption of a large amount of labor which would otherwise be discharged from the Royal dockyards. The representatives of dockyard labor will at once be consulted.

We are indebted to the Board of Admiralty for the help which they have rendered, and I desire to state that, having expressed their technical view on the minimum armaments they consider to be necessary, they have furnished us with loyal help in achieving our object with the least possible dislocation and hardship.

I ought to add that it is recognized by all the Powers concerned that a preliminary agreement on Anglo-American differences is essential to a general agreement on naval building, and the Governments of the Powers represented at Washington, 1921-22, have been informed of the conversations. So soon as the way is cleared, they will be invited to a preliminary conference, so that we may all together try to come to an agreement of a comprehensive kind. The final agreement would be ratified at a place which I hope will by common consent be chosen by the United States, as a recognition of the splendid part played by its President in these transactions, and then reported to the Preparatory Commission of the League as a contribution to its work.

If these intentions are fulfilled, the request of the Chairman of the Preparatory Commission on Disarmament made at Geneva on

March 15, 1928, that the Powers should make an attempt to agree among themselves will be accomplished, and we shall be in a position to pursue with that Commission the difficult but essential problems of how to reduce other forms of armaments in accordance with the pledge given by the Allies at Versailles when imposing disarmament on Germany and its associated nations, and in pursuance of the Pact of Peace. To that his Majesty's Government will direct its thoughts and its energies in coöperation with other nations, so soon as this more immediate work on naval agreement has been finished. A general Disarmament Conference will then be possible. I am anxious that the House should not minimize the difficulties in our way, nor the time that will be required for the negotiations, but they may be assured that it will be our care to make our own policy clear and our desire to put our energies into a settlement without unnecessary delay. (Cheers.)

Strengthen Atlantic Fleet

Baltimore *Sun*, August 7.—Whatever may become of the Anglo-American naval conversations, which were resumed today between Ramsay McDonald, Prime Minister, and Ambassador Dawes, the British Admiralty already has decided upon a fundamental change in the distribution of its naval forces. By the recall of the five battleships of the *Queen Elizabeth* class from the Mediterranean the balance of naval power will be transferred from Malta and Gibraltar to home ports. The *Elizabeths* will join the Atlantic or home fleet in November as soon as they have completed summer exercises in the Mediterranean.

GREATEST SEA FORCE

With the accession of these great ships the Atlantic fleet will become the greatest naval fighting force in the world. At present the Atlantic armada contains nine capital ships, including the monsters, *Nelson* and *Rodney*, and the Admiralty's new policy raises this number to fourteen. In addition to these the battle cruisers *Hood*, *Repulse* and *Renown* will make up the mightiest fleet that ever has sailed the seas.

Official reason for the change is that the harbor accommodation at Malta is inadequate, but, when it is remembered that Valetta harbored the French as well as the British fleet during the war, it is obvious there is more behind the Admiralty's decision than the question of detail. In naval quarters the transfer of the *Elizabeths* to England is generally associated with international negotiations.

Gun Explosion on Board H.M.S. "Devonshire"

The Engineer, August 2.—It is with great regret that we have to record a serious gun accident, which took place on Friday of last week, July 26, on board H.M.S. *Devonshire* during firing practice in the Eastern Mediterranean, in which seventeen lives were lost, and other injuries inflicted. According to an official Admiralty report, it has now been ascertained that the cause of the accident was a hangfire of very short duration in one gun of an 8-inch turret. Owing, it is stated, to the simultaneous discharge of other guns in the ship, including the other gun in the same turret, it was probably momentarily thought by the gun member controlling the breech mechanism that the gun in question had also fired, and the operation of reloading was therefore commenced. It appears probable, the report further states, that the mistake was almost immediately discovered, but that before it could be fully rectified, the charge in the gun exploded, and blew out the breech block, which was then partly unlocked. The great force of the explosion also ignited cordite charges in their containers, which were waiting ready for loading for the next round. H.M.S. *Devonshire* will shortly sail for England in order that repairs may be carried out. She is, it will be recalled, the second of the four 10,000-ton ships of the 1925 cruiser program, and was launched at Devonport Dockyard in October last year.

Naval Expenditure

Naval and Military Record, July 24.—In reply to Sir John Power (C., Wimbledon) in the House of Commons on Thursday, Mr. Alexander, First Lord of the Admiralty, said the estimated net naval expenditure of this country for the current year was £55,865,000.

The actual expenditure for 1924-25 and 1913-14 was £55,693,787 and £48,732,621 respectively.

Launchings

London *Times*, August 8.—The flotilla-leader *Codrington* is to be launched today

from the works of Swan, Hunter and Wigham-Richardson, Wallsend-on-Tyne. This is the first vessel of the type built since the War, and when completed early in 1930 will be sent to the Mediterranean to relieve one of the leaders of War-time construction. The *Codrington* will be of 1,520 tons, with a length of 332 feet. Geared turbines of 39,000 S.H.P. will give her a speed of 35 knots, and she will have a capacity for 425 tons of oil fuel. The armament will include five 3.7 inch guns, seven smaller guns, and eight torpedo tubes. The naming ceremony today will be performed by Lady Codrington, the wife of Lieutenant General Sir Alfred Codrington, who is a descendant of the Admiral after whom the vessel is named.

Today also there is to be launched, without ceremony, the destroyer *Acasta* from the works of John Brown and Company, Clydebank. This is the first of two destroyers, out of the eight in the 1927 program, building by this firm, the other being the *Achates*. They are to be of 1,330 tons, 312 feet long, with geared turbines of 34,000 S.H.P. giving a speed of 35 knots. Provision is made for 380 tons of oil fuel, and the armament will consist of four 4.7-inch guns, seven smaller guns, and eight torpedo tubes. The name Acasta in the Royal Navy dates from 1797, the last ship to bear it being a destroyer which served throughout the late War, and specially distinguished herself at the battle of Jutland.

New Vessels

Submarines

London *Times*, August 17.—The submarine *Oswald* is due to be completed for service today at Devonport, where she has been delivered by Vickers-Armstrongs, Limited, after construction at their Barrow works. The *Oswald* is intended for service on the China Station, under Lieutenant-Commander P. Ruck-Keene, formerly second-in-command of *X-1*, the world's largest submarine. One vessel of similar type, the *Osiris*, has already been completed, and four more the *Otus*, *Odin*, *Olympus*, and *Orpheus*, are due for completion, the first two in September, and the others in October and December respectively. All are to be employed in China in place of "L" class submarines already withdrawn and placed on the sale list. No addition to the total of British submarines is therefore involved by the completion of these boats. The total was shown in the last official return of fleets of the world as 52, as compared with 122 for the United States, 69 for Japan, 52 for France, and 45 for Italy.

Aircraft Carrier

London *Times*.—The Admiralty have approved of the *Glorious* commissioning, on completion of conversion to an aircraft carrier, with a Devonport crew, as an independent command, for service in the Mediterranean Fleet.

When the *Glorious* joins the Mediterranean Station the *Courageous* will return to England for service in the Atlantic Fleet. She will continue to be manned from Portsmouth.

The *Glorious* is being converted at Devonport Dockyard at an estimated cost of £2,137,374.

Admiralty to Test New Type Rudder

Naval and Military Record, August 7.—The British Admiralty, it was learned in London yesterday, has begun experiments with the type of rudder which is fitted to the German liner *Bremen*, and which is thought to be one of the principal factors in the high speed maintained during the round trip to New York and back.

The rudder is designed by Dr. Oertz, of Hamburg, on aëronautical principles, a streamline form very much like the wing of an airplane being used to reduce disturbing eddies and currents. The effect of this is said to be to reduce resistance to the speed of the ship, to keep the vessel on a more straight course than is possible otherwise, and to leave comparatively unbroken water for the propellers to work in.

The ship selected by the Admiralty for a preliminary trial of the rudder is H.M.S. *Olna*, of the auxiliary fleet, an Admiralty oiler built at Devonport some years ago.

ITALY

Submarines Held Vital by Il Duce

Washington *Post*, August 25.—Rome, August 24 (N.Y.W.N.S.).—Officially, Italy maintains the closest silence in regard to the disarmament conversations which have been going on between Premier Ramsay MacDonald and Ambassador Charles Gates Dawes at Scotland.

Unofficially, the New York *World* News

Service has been able to ascertain the chief points in naval opinion here. Italy's disarmament policy must always be based on three important principles which Premier Benito Mussolini has enunciated on several occasions before the Italian Senate and Chamber of Deputies.

First, Il Duce upholds reduction as against limitation. Second, he approved all-around reduction of land and air forces as well as of naval forces. Third, Italy can not forego the use of submarines.

SUBMARINES HELD NECESSARY

All Italian Naval experts are convinced that submarines must form a valuable part of this country's defense. The shape of Italy and her extremely long coast line in proportion to her area and the small sums at her disposal for building big craft compared with the United States and Great Britain, make this class of ship absolutely indispensable to the national defense. During the World War it was shown that even Spezia, Italy's most important naval stronghold, hidden in the gulf, was liable to bombardment from enemy submarines which could slip inside the harbor notwithstanding the formidable fortifications.

Naval experts here say that submarines can only be fought with submarines. Otherwise, they contend, enemy submarines come into the harbor and destroy dreadnaughts and cruisers and other big craft.

They explain that aircraft also can only be fought by aircraft as anti-aircraft guns are not effective. Another point which to Italian naval men presages difficulties at forthcoming disarmament conferences is that the problem cannot be reduced to technical formula, but must have a political premise and must be supported by the will to reach a common goal. All armaments are determined by some particular possibility of war which every state examines with reference to some other state. Great Britain and America think of each other. Italy and France must do the same.

SHORT MEASURE ACCEPTABLE

There is a feeling here that when Ambassador Hugh S. Gibson made his famous "relative values formula" at Geneva last April he drew near to truths which Fascism has hitherto been alone in stressing. Italy is ready to accept the lowest figure in yardstick proposals accepted by other continental powers, but will not reduce her naval armaments unless they do.

It is a known fact that Mussolini draws a sharp distinction between British and American armaments and continental ones. This appears to indicate that Italy thinks the French navy is the one likely to cause her trouble in the future. Her old rival Austria, no longer has any sea power and the navy of Jugoslavia is still a negligible quantity.

It is certain that Mussolini would not refuse to attend a naval disarmament conference if there were any reasonable proposals to be considered by it along the lines outlined above.

JAPAN

Replacement of Battleships

London *Times*, August 7.—Naval officials stated today that Japan would readily agree to extend by five years the term during which battleships are not to be replaced, if Great Britain and the United States made such a proposal. It was indicated that the British and American Governments were discussing the idea, but had not reached a conclusion, and Japan's views had not yet been asked.

The Admiralty has displayed foresight in arranging it budgets, so that when the time comes for replacing capital ships its financial resources may be relatively free. The last ships of the eight 10,000-ton cruiser program are in hand, and various necessary shore improvements are drawing to a close. Nevertheless though the naval chiefs have thriftily prepared against the expiry of the Washington Agreement, the need of avoiding expenditures while the country is getting back to the gold standard will make any Government glad to postpone the heavy costs of replacing the battle fleet.

MERCHANT MARINE

The "Britannic"

London *Times*, August 7.—The twin-screw motor passenger liner *Britannic*, built By Messrs. Harland and Wolff, Limited, for the White Star Line, was launched at Belfast yesterday. The *Britannic* is intended for the Liverpool-New York service, and, with a gross register of 27,000 tons, will be the largest British motor-ship. She is modeled on the newest lines, with a straight stem and cruiser stern, and is fitted with two of the low

funnels characteristic of most of the large motor liners recently built.

The accommodation provided for the 1,550 passengers (cabin, tourist cabin, and third class) includes a swimming pool and tennis courts in the cabin class, and elevators and children's play rooms in the tourist cabin and third-class accommodation. The principle public rooms on the promenade deck include a card room in late French Gothic, and the lounge, in eighteenth century English style, offers facilities for dancing and cinematograph performances; from it a long gallery gives access to a Tudor smoking room. The drawing room, which is in white and green, is specially arranged to permit of its use as a chapel.

Safety Conference Adopts Radio Rules

Nautical Gazette, August 24.—To insure maximum protection, a new and rigid code of rules for the use of radio at sea was adopted at the recent Safety of Life at Sea Conference held in London. Text of the rules, which are to become effective on July 1, 1931, provided five nations have ratified the convention, were made public this week by the Navy Department.

The rules, in part, are:

All ships engaged on international voyages, except cargo ships of less than 1,600 tons gross tonnage, shall (with few exceptions) be fitted with approved radio transmitters and receivers. Every passenger ship of 5,000 or more tons gross tonnage shall be equipped with an approved radio compass.

Each passenger ship required to be fitted with a radio shall carry a qualified operator and, if not fitted with an auto-alarm, shall, while at sea keep watches by means of a qualified operator or a certified watcher, as follows: (a) Under 3,000 tons gross tonnage—as determined by the adminstration concerned; (b) 3,000 or more tons gross tonnage—continuous watch.

Each cargo ship which is required to be fitted with radio, shall carry a qualified operator, and if not fitted with an auto-alarm, shall, while at sea, keep watches by means of a qualified operator or certified watcher, as follows: (a) Under 3,000 tons gross tonnage—as determined by the adminstration concerned; (b) from 3,000 to 5,500 tons gross tonnage—at least eight hours' watch per day; (c) above 5,500 tons gross tonnage—continuous watch.

On all ships fitted with an auto-alarm, such apparatus shall, while ship is at sea, always be in operation when an operator or watcher is not on watch.

A watcher's certificate may be issued to an applicant who is capable: (a) of receiving and understanding the alarm, distress, safety, and urgency signals when these signals occur among a series of other signals; (b) of correct reception by ear code of groups at a speed of 16 five-character groups per minute (each figure or punctuation mark counting as two characters); (c) of regulating the radio receivers used on board.

Italian Super-liners

Nautical Gazette, August 3.—According to a declaration made by the president of the administration board of the Lloyd Sabaudo, Marquis De La Penne, an important agreement was concluded recently between the Lloyd Sabaudo and the Navigazione Generale Italiana regarding the construction of the Italian super-liners. Two liners of over 40,000 tons each will be built as soon as possible in Italian yards. Technical studies have already been made by experts of the two companies. The Lloyd Sabaudo has also had many offers from Italian yards regarding data necessary to facilitate the agreement. The problem was a very difficult one. The Italian merchant marine, in order to face the German competition offered by the *Bremen* and the *Europa,* was obliged to build ships over 40,000 tons, but for their construction the aid of the government was deemed necessary. The N.G.I. proposed to build immediately one of these super-liners, but the Lloyd Sabaudo and Cosulich, merged since July, 1928, with the N.G.I. in the American passenger trade, each wished to build a super-liner and requested the government for the same aid and facilities as were asked by the N.G.I. As three liners of 40,000 tons each were not considered necessary by the experts, the conclusion to the many discussions is in accordance with the announcement by the Marquis De La Penne.

The two liners will be built in Italian yards, according to the provisions of the Shipping Credit Institute, which grants loans up to 60 per cent of the value of the ship at 2½ per cent interest, and also a premium for speeds in excess of fourteen knots. The sum requested by the yards for the construction of these liners is about the same, but

there are considerable differences in the terms and conditions of payment. According to the best information, the N.G.I. liner will be named *Guglielmo Marconi,* and will be built by a yard on the Ligurian Riviera. The Lloyd Sabaudo ship will be named *Conte Azzurro,* and will be built by the Stabilimento Technico Triestino, which built the *Conte Grande.* The cost of these liners is estimated to be about $15,000,000 to $17,500,000.

The chief particulars are as follows: Length, 806 feet; breadth, 97 feet; gross tonnage, 42,000 to 45,000; speed, 27 to 28 knots. The engines will be of the Parsons turbine type, similar to those used by the Canadian Pacific and by the *Ausonia.* The horsepower will exceed that of the *Bremen* and *Europa.* While the liners will be used in the New York service, they may be sent to Brazilian and River Plate ports. A definite statement from the companies to the press will be made as soon as possible.

I am also informed that the Ansaldo Shipbuilding Company is doing all possible to settle the questions pending with the N.G.I. concerning the construction of the *Roma* and *Augustus* (questions involving about $1,000,000) in order that their chances of receiving the order for the *Guglielmo Marconi* may be bettered.

ENGINEERING AND RADIO

Pulverized-Fuel Steamer Arrives at Glasgow

Marine Engineer and Motor Ship Builder, August.—Considerable interest was aroused in marine engineering and shipping circles on the Clyde by the recent arrival at Glasgow of the cargo steam *West Alsek,* belonging to the United States Shipping Board. This vessel, which is fitted with the Todd Unit System of pulverized-coal burning, is the first steamer to cross the Atlantic using only pulverized-coal fuel. She was berthed in Glasgow Harbor, and on the invitation of representatives of her owners and the Todd Corporation, a large number of engineers, shipbuilders, and shipowners inspected the ship, paying special attention to the pulverized-fuel apparatus.

The *West Alsek* is a cargo steamer of the ordinary type, of 5,637 tons gross, built by the Skinner & Eddy Corporation at Seattle in 1918. Her propelling machinery consists of triple-expansion engines, and the auxiliary machinery both below and on deck is of the type found on the majority of steam cargo carriers. There are three single-ended Scotch boilers, each having three furnaces. Before the furnaces were converted for the use of pulverized fuel the boilers were equipped to burn coal on the grate and used Howden's type of stoker, separate for each furnace. The Shipping Board designated the *West Alsek* for the installation of the Todd pulverized-coal burning equipment, because she is representative of the majority of ocean-going freight steamers in machinery equipment, speed and general make-up.

The *West Alsek* left New York on July 5, and she carried about 100 barrels of oil for starting the fires at the commencement of the voyage. Except for that the voyage was made entirely on pulverized fuel. On the vessel's arrival in Glasgow it was claimed that the system of pulverized-coal burning showed a reduction in coal consumption, and there was also a reduction of 25 per cent in number of firemen employed. The system is arranged so that a direct line is made from the pulverizer to each furnace, thus solving the problem of distributing the fuel after pulverization. It is claimed that the voyage of the *West Alsek* marks a distinct advance in the method of burning pulverized fuel.

Helium for Use of Military Dirigibles

Engineers and Engineering, August, 1929.—The successful transatlantic flight of the monster dirigible, the *Graf Zeppelin,* and the announcement by the Navy Department of the awarding of a contract for two leviathans of the air, of far larger dimensions even than the great German airship, have aroused keen interest in the possibilities of safe and rapid travel by means of these huge lighter-than-air craft. Great Britain is constructing two palatial dirigibles intended for transoceanic service; and private American interests have taken up in earnest the manufacture of gigantic air liners.

If these argosies of the air are to offer the real assurance of safety necessary to their completely successful use, it is essential that they depend for buoyancy on an uninflammable gas. The only gas of this description having the requirement of lightness is helium, that very rare element found, in small proportions, in certain natural gases. As is well known, the hydrogen gas used as the lifting agent of the *Graf Zeppelin* is extremely explosive, and the accidental igni-

tion of hydrogen has been responsible for disasters to various airships in the past.

The dirigibles operated by the Army and the Navy of the United States are provided with helium; but all foreign-owned air-craft must depend on the highly inflammable hydrogen for their buoyancy. This situation is because the United States is the only nation, so far as known, having sufficient resources of helium to develop a commercial supply for aëronautics.

It requires, however, a great amount of helium to fill the gas cells of a big dirigible, a little over two and a half million cubic feet of helium being needed for the *Los Angeles*. In those rather rare natural gas deposits that contain any helium at all, no more than between 1 and 2 per cent by volume of the gas can be extracted as pure helium.

The known natural gas fields to which the United States can look for obtaining its helium are not inexhaustible. In fact, the Petrolia field in northern Texas, which has been the principal source of supply, is now in the last stages of its life, after producing gas for more than twenty years. Where, then, are to be obtained the large supplies of helium necessary for the continued safe operation of the two air monsters recently contracted for by the Navy, and other ships to be built from time to time?

The maintenance of these vital helium supplies is one of the jobs put up to the Bureau of Mines, the scientific bureau that has kept Uncle Sam in helium for the past several years. For years, the chemists of the bureau have been analyzing samples of natural gas from many fields located throughout the country, always in quest of the characteristic bright yellow line which, viewed through the spectroscope, announces the presence of the prized helium. This analytical work has resulted in accumulating valuable data regarding our helium resources; and the answer to the question as to where Uncle Sam is to obtain his helium, for some time to come, at least, has been found, it is considered, in the Cliffside natural gas structure lying in the northwest of the city of Amarillo, in the Panhandle district of Texas. A big helium production plant, embodying in its helium separation cycle the results of thorough research on the part of the Bureau's specialists, is nearing completion near the town site of Soncy, about six miles west of Amarillo.

Rapid progress is being made in the construction of the new plant. The buildings have been completed, and the equipment is now being installed. Gas for the project is to be supplied by the Amarillo Oil Company under a contract with the government covering gas rights in 26,000 acres of land on the Cliffside structure. The company now has three gas wells, with a combined open flow of 27,000,000 cubic feet per day, available for the exclusive use of the plant. A fourth well now being drilled has reached the gas producing horizon, and the completion of this well is expected within a short time.

In the new Soncy plant, the helium will be recovered by cooling the gas to approximately 300 degrees Fahrenheit below zero, at which temperature all of the constituents of the gas except the helium, are liquefied, permitting the helium to be drawn off as a gas and compressed into tank cars or steel cylinders, for shipment to points where it will be used primarily in the Army and Navy lighter-than-air craft. The extremely low temperature to be used in the plant will be produced by compression, and subsequent expansion of the gases. At the minimum plant temperature, atmospheric air is a liquid, carbon dioxide and mercury are solids, lead and copper take on properties of steel, and rubber is as brittle as glass. In comparison, such temperatures as are found at the North Pole would be unbearably hot. Placing an icicle in the liquefied gases in this plant would be like thrusting a hot poker into water.

The Cryogenic Laboratory of the Bureau of Mines, in which data for use in improving helium production and purification processes are developed, contains complete equipment for conducting research at low temperatures. Because of the extremely low temperature at which certain operations are conducted in this laboratory it has been called "the coldest spot in the world."

During use in airships, helium escapes and air enters through the walls of the gas cells; therefore, at intervals, the helium in an airship must be removed, purified, replenished, and put back. Three helium purification plants have been designed by the Bureau of Mines, and constructed under its direction. The first of these is a stationary plant at Lakehurst, N.J., built for the Navy; the second, a mobile plant mounted in a railroad car, built for the Army; and the third is a stationary plant for the Army erected at

Scott Field, Ill. The Scott Field plant is capable of purifying 10,000 cubic feet of helium per hour.

New Radio Beacon Can Sift Plane Course from Among Twelve

New York *Times,* August 18.—A new type of beacon radio transmitter, emitting signals marking any number of courses up to twelve at any desired angles, has been developed by the Bureau of Standards in cooperation with the Airways Division of the Department of Commerce. Their joint researches have been devoted lately to fitting the beacon system to complicated airways situations, such as those occurring where numerous airways converge on a single airport.

This multi-directional beacon employs a three-phase transmitter. A three-reed indicator on the pilot's instrument board suffices to furnish guidance along any one of these airways and also to furnish information to a lost pilot as to which course he is on. Captain F. C. Hingsburg, chief engineer of the airways, says that several of the new transmitters have been ordered and will be installed as speedily as received.

Experiments have been in progress to reduce to a negligible amount the harmonics radiated by the directive radio beacon. A special filter circuit designed to by-pass the harmonic current entering the goniometer primary windings resulted in a 70 per cent reduction in the ratio of harmonic power to fundamental power radiated. As some decrease in the total fundamental power radiated was observed, work was begun to avoid this reduction by an improved filter circuit.

Design of the new three-reed course indicator for use with the twelve-course beacon has been modified to conform in shape and dimensions with other instruments commonly mounted in aircraft. Specifications for construction of the two-reed course indicator have been extended to include the use of elinvar reeds. The elastic contents of elinvar are independent of temperature and therefore need no temperature compensating device.

Experiments with both aural and visual radio beacon signals were conducted in flight tests between Washington and Richmond on a Pitcairn Mailwing airplane equipped with the latest type of shielding assembly. This plane is now on the shuttle mail run between Washington and Hadley Field, N.J., and uses the visual beacon at College Park, Md., and the aural beacon at Hadley Field.

Another experiment has been conducted with a beacon transmitter for fog landing constructed and tested by the Bureau of Standards for the Guggenheim Fund for the Promotion of Aeronautics. This has been sent to Mitchel Field for experiments in "blind" flying by Lieutenant James Doolittle, Army Air Corps pilot temporarily detailed to research work with the Guggenheim Fund.

This transmitter is designed to mark out a path for landing an airplane at a constant horizontal angle with the ground. First tests were reported unsuccessful, probably because of ground inductive effects.

A New Metal

Nautical Gazette, August 24.—Development of a new metal known as "Konel," which is credited with being much stronger than other metals at high temperatures and which can be used extensively in the moving parts of internal combustion engines and other extremely hot places, has been announced by officials of the Westinghouse Electric and Manufacturing Company. The announcement followed the granting of foreign patent rights.

Originally developed by the Westinghouse research laboratories as a substitute for platinum in the manufacture of filaments for radio tubes, the new metal was discovered to be harder to forge than steel, and to be very tough at high temperatures, when most metals lose their strength.

The new metal was created by Dr. E. F. Lowry, a graduate of Ohio State University.

AVIATION

Civil Aëronautics in Japan

The *Aero Digest,* August, by George J. Haering, U.S. Vice Consul, Kobe, Japan.—Civil aëronautics in Japan emerged from its infancy during the past year, but its present extent is still small in comparison with civil flying in the other countries with which Japan is ranked as a world power.

Developments during the present year, however, will probably mark the beginning of a new era in the annals of Japanese aëronautics. Government assistance will be extended to civil flying through greatly augmented direct subsidies and by the construc-

tion of airports and other facilities for commercial air service. These services are now four in number, operating over a total distance of 1,075 miles. Under the new policy, and within the next two years, three additional lines will be inaugurated over a distance of 1,289 miles, and the frequency of flights on two of the existing routes will be increased.

Japanese civil aëronautics is under the handicap of two adverse conditions—first, the probability that, for several years to come, the attention of the Japanese will be concentrated on development of their automotive communications, and that aëronautic activities are not likely to be undertaken by any significant number of private individuals; and, second, the lack of air-mindedness, the majority regarding civilian airplane flights as stunts or as a means of employing and training aviators for national defense.

These handicaps naturally have affected the development of civil aëronautics in Japan, but strenuous efforts have been made by the large Japanese daily newspaper *Asahi* to stimulate public interest and knowledge in aëronautics through exhibitions of airplane flying through the Japanese flight from Tokyo to Rome in 1925, and through the organization of the first regular passenger air service in Japan.

The lack of general interest in civil aëronautics and its practical use is most evidenced in the paucity of letters sent by existing airmail routes, even though no extra postage is charged. A considerable factor in this attitude, however, is the absence of night flying and the departure hours of mail planes, which have offset the saving in time between air mails and those transmitted by rail during the greater part of the week.

Civil aëronautics in Japan at present consists of (*a*) four commercial services maintained by private companies, with the aid of government subsidies; (*b*) air-news services operated by several Japanese newspapers for rapid conveyance of photographs and reports; (*c*) flying by a few individual enthusiasts engaged in aëronautic research or instruction; and (*d*) test flying by pilots of airplane manufacturers. Altogether, there were registered in Japan during August, 1928, a total of 215 pilots, of whom 6 were women and 4 were foreigners attached to aviation works. The number of airplanes owned or operated by civilians at that time is estimated to have been approximately 100, of which only about 60 are in operation for any considerable time.

The four companies maintain, respectively, a tri-weekly passenger, parcel, and mail service between Osaka and Tokyo (272 miles), using eight machines that accommodate twenty-two passengers in all; a tri-weekly mail service between Tokyo and Sendai (229 miles), using seven machines; a tri-weekly passenger and mail service between Osaka and Fukuoka (310 miles), using seven machines that accommodate seven passengers in all; a regular passenger and mail service between Sakai and Oita, via Takamatsu and Imaharu (263 miles), using five machines.

Newspapers and news agencies, the civil operators next in importance, transmit part of their inter-office communications by airplane, and by the same means obtain from distant parts of the empire prompt reports and pictures of current events having important news value. Carrier pigeons also are used for this purpose when short distances are involved.

The eight principal newspaper operators maintain altogether more than twenty airplanes in this line of work, and the largest three also sometimes deliver their papers when abnormal conditions prevail in any section of the country necessitating a different method of delivery.

Japan at present has seventeen airports available for civil aëronautic use—seven land airports, seven marine, one international in Japan proper and two in Chosen. Another is projected for Naruo, near Kobe. The only international civil airport is that at Kizugawa, within the city limits of Osaka, opened to traffic on April 1, 1929, when the semi-official Japan Air Transport Company commenced its services. This field has an area of approximately 3,600,000 square feet on the shore line of Osaka Harbor.

Open-water or military aviation fields in the neighborhood of large cities have hitherto been used, with few exceptions, by commercial air services and international fliers. The military authorities have been accommodating in this respect when landings have not involved unauthorized flying over fortified zones.

Temporary land and marine airports for the use of the Japan Air Transport Company will be completed by the government during

the present year at Fukuoka, Tokyo, and Tsushima. Permanent facilities, including direction-finding apparatus, are asked for in the budget presented to the Diet.

The government general of Chosen has in hand the construction of international airports at Urusan and Joita, and the government at Dairen is preparing an aviation field near that city. All Government airports are to be fitted with wireless and meteorological equipment, but no provision has been made as yet for the construction of lighted airways. The Chosenese government has established eight aviation landmarks to guide fliers from the Manchurian border.

There are also several private airports in Japan, most of them consisting of a small level field and a hangar or a shed on the beach for the housing of seaplanes. These private fields usually are ground leased by commercial operators, newspapers, aëronautic schools, or research workers.

The domestic manufacturing of aircraft and aëronautic equipment within Japan has been fostered by the military and naval authorities to such an extent that the thirteen manufacturers are able to meet all ordinary requirements, though their products are said to be somewhat in arrears of developments in Europe and the United States.

It is probable, therefore, that airplanes embodying the latest features will be imported in limited numbers, principally for use in commercial air services and as guides for Japanese manufacturers. Aircraft engines will be purchased abroad in greater numbers, even by the Japanese armed forces, as will also materials for airplane construction and aëronautical instruments. These are precision products, which can probably be made more economically abroad than in Japan.

Practically all Japanese airplanes are copies or modified imitations of foreign machines, and the leading manufacturers of airplanes and engines hold licenses from European manufacturers for the production of the types of units they make. Some preference for the imported engines is shown, even by the army and navy. The industry owes its existence to the military requirements of the empire and to the desire of the authorities to make the country self-supporting in the event of an emergency. In view of the present stage of development of the Japanese aëronautics industry, it is not anticipated that competition from Japanese manufacturers will be felt in the aircraft markets of other parts of the world.

The rapid progress made abroad in civil flying after the war, the adherence of Japan to international conventions relative to air navigation, and the meager advances in Japanese civil aëronautics while under the jurisdiction of the War Office led to the transfer of the control of civil flying to the Department of Communications in the early months of 1923, where an aëronautics bureau was organized for the regulation and promotion of Japanese civil aëronautics.

Since 1923 the assistance of the government has been noticeable in Japanese civil aëronautics, though aid from this source was not very substantial until last year. In the fiscal year 1923-24 official encouragement consisted chiefly in the sale to civilians of obsolete military airplanes at nominal prices. These sales, continued at irregular intervals, have enabled Japanese newspapers, aëronautic schools, and research workers to obtain most of the machines with which the flying under their auspices has been conducted.

Two years later the bureau received an appropriation of 90,000 yen ($36,000) for distribution among civilian fliers as a subsidy to maintain and replace airplanes and to compensate for damages received by aviators and machines. Increased appropriations have been received during each subsequent year, reaching 356,000 yen ($164,472) during the fiscal year 1928-29.

The aëronautics bureau also furnishes annually to a small number of selected youths an eight-months' training course at an army or navy aëronautics school.

In 1927 the sum of 493,000 yen ($234,175) was made available to the Imperial Aëro Association of Japan for initial preparations leading to the operation of air services from Tokyo to Shanghai and to Dairen.

Part of the government appropriations received since 1925 for civil aëronautics have been expended in subsidizing the four commercial mail services mentioned previously. Subsidies were increased during 1928 to an average rate of approximately 30 sen (14 cents) per kilometer and flights became more regular and frequent. It was also during 1928 that the government gave full expression to its delayed decision to place Japanese

civil aëronautics on a basis which would enable Japanese airlines to meet future competition on the airways radiating from the country by authorizing the formation of the semi-official Japan Air Transport Company, with the promise of a subsidy totaling 19,970,000 yen ($9,226,140) over a period of 11 years. The government also guaranteed the stockholders a minimum dividend of 8 per cent per annum.

The aëronautics bureau has introduced into the 1929-30 budget an item calling for the expenditure of 3,845,292 yen ($1,768,834) to be spent over the years 1929, 1930, and 1931 on the construction of civil airports at Tokyo, Fukuoka, and Tsushima, along the new international airway between Tokyo and Seoul in Chosen (Korea).

Expansion of civil flying in Japan is centered in the Japan Air Transport Company, and the description of that company's plans is equivalent to an outline of the major developments to be expected in the civil aëronautics of the country.

This concern, named in Japanese the Nippon Koku Yuso Kabushiki Kaisha, was incorporated in Tokyo on October 20, 1928, under the auspices of the Japanese government, with an authorized capitalization of 10,000,000 yen ($4,600,000). Only Japanese subjects are permitted to hold stock in the company. A dividend of 8 per cent per annum is guaranteed by the Japanese government, which is represented on the board of directors by a high official of the Department of Communications.

Active operations of the company commenced on April 1, 1929. Its plans include the inauguration of a twice-daily round-trip service between Osaka and Tokyo (excepting Sundays), six round trips weekly between Osaka and Fukuoka, and three round trips weekly between Seoul and Dairen. Test flights are also to be undertaken during the present year between Fukuoka and Shanghai. Passengers, mails, and parcels are to be carried on all lines.

During 1930 the number of weekly return trips between Fukuoka and Seoul is to be increased to six, and the same number of round voyages is to be made weekly between Seoul and Dairen. The schedule between Fukuoka and Shanghai is to be placed on a regular tri-weekly basis. Eventually the company's services are to be extended to Mukden and North Manchuria (where connections will be made with Trans-Siberian Airways) and to northern points in Japan.

The lines commenced in April of this year supersede two of the four commercial services mentioned heretofore, namely, that operating the Tokyo-Osaka line and that operating the Osaka-Fukuoka line.

It is estimated that 90 per cent of the company's revenue will be obtained from the carriage of mails and 10 per cent from passenger traffic.

The equipment of the Japan Air Transport Company will consist of twenty-nine airplanes and thirty-four spare engines.

The Redrup Axial Aëro Engine

The Redrup Lever Engine Syndicate, London, England.—The advantages of air-cooled as compared with water-cooled engines are:

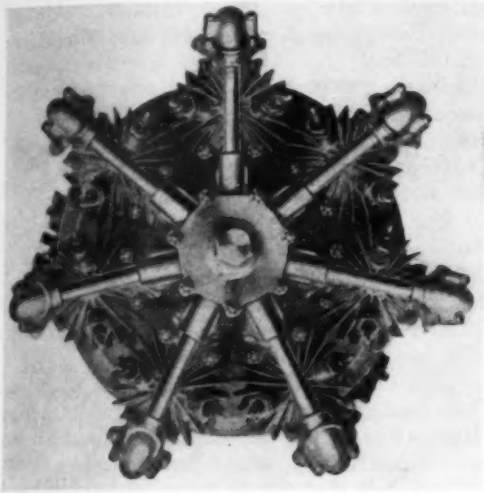
(a) low power weight ratio due to absence of radiators, water, pumps, pipe connections etc., and to other constructional simplifications;
(b) greater reliability, for the same reasons;
(c) independence of large variations in air temperature;
(d) cheapness of manufacture, for the same reasons.

The one great disadvantage of the air-cooled engine, as hitherto known is its shape, and its large frontal area. In order to cool all the cylinders of an air-cooled engine the radial arrangement is usually adopted (this applies to engines above 100 H.P.). Such an arrangement gives rise to frontal areas several hundred per cent greater than those of corresponding water-cooled engines. It is apparent that the retention of water-cooled engines is due not so much to their merits as to the one great defect from which air-cooled engines have hitherto suffered. Thus in the case of civil aircraft, it is seen that air-cooled engines have been adopted generally in spite of their detrimental effect upon performance (with the exception of climb).

In the case of single engine machines the fuselage drag is determined by the frontal area of the engine and by the shape of that frontal area. The exception to this rule is the case in which the fuselage must in any case be of very much larger cross section than the frontal area of even the most un-

favorable engine. But even in this case an engine of large frontal area usually spoils the nose of the machine.

Generally speaking, therefore, it is true to say that a reduction in the frontal area



90 H.P. REDRUP AXIAL AERO ENGINE
Front View

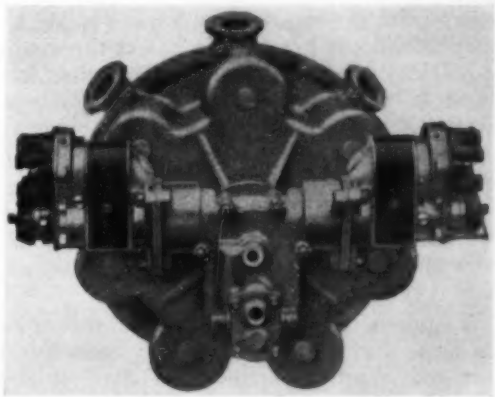
of an engine will lead to a proportionate reduction in the fuselage drag of a single engine machine. As this drag constitutes a very large part of the total drag, any considerable saving becomes of extreme importance.

In the case of twin and other multi-engine machines the advantages of low frontal area of the engines are accentuated not merely because there are several engines, but also because they are placed in the air stream where their head resistance is additional to that of the fuselage. Here again a considerable reduction in engine drag leads to a large percentage reduction in the total drag of the machine.

Many attempts have, for the above reasons, been made in the past to build engines with a lay-out which, whilst permitting air-cooling of the cylinders, would not involve the high frontal area and drag of the radial engine. The obviously ideal arrangement consisting in placing the cylinders parallel to and around the crankshaft has been frequently attempted, but until the advent of the Redrup Axial Engine such attempts have proved abortive because of their reliance upon mechanism in which extremely high friction velocities are inherently unavoidable, such as swash plate and cam arrangements.

Other ways of achieving the much desired results have also been tried. The four cylinder in line, for instance, has met with success for powers up to 100 H.P. but is still far heavier than radials. Although it succeeds in reducing the frontal area, its shape does not lend itself to efficient streamlining, particularly in relation to the spiral air flow which makes up the slip stream of an air screw. The in-line arrangement is severely limited to a small number of cylinders, each of small size. In order to circumvent this limitation designs involving more than one crankshaft and therefore of considerable complexity are being resorted to, which further illustrates the need and the difficulty of solving this crucial problem of aëronautical engineering.

The Redrup Axial Engine constitutes a practicable and proved solution to this problem. Briefly it is an air-cooled petrol engine with pistons, cylinders, valve gear, etc., following standard practice but unique in that it embodies means for transmission of power from the piston to the propellor shaft which, whilst permitting of the axial arrangement, is fundamentally sound and, mechanically, non-experimental.



90 H.P. REDRUP AXIAL AERO ENGINE
Rear View

The Redrup Axial Aëro Engine is a multi-cylinder single crank engine in which the cylinders lie parallel to and around the crankshaft. The latter is of the Z type and carries, on ball bearings, a star member

with as many branches as there are cylinders. The ends of each arm of the star member are connected, through suitable gudgeon pins and connection rods, to their respective pistons. The star member is prevented from rotating by a stabilizing fork hinged at the center of oscillation and held at a point of the crank case where the full torque reaction of the engine is taken.

Vulnerability of Panama Canal Air Bases

The New York *Herald Tribune,* August 11.—Cristobal, August 10.—Declaring that France Field and the $5,000,000 Albrook Field now under construction would be under shellfire in event of an attack, the Panama department of the American Legion, in a resolution adopted at its tenth annual convention this week, recommends the transfer of the new military field to Casa Larga, twelve miles from here. The field, in event the transfer took place, would be only a mile from Lake Adden, now being dammed, and would leave the Albrook site open to commercial air traffic.

Setting forth that Albrook and France Fields are close to the coasts, the resolution said that the "first would certainly be in the field of combat in an attack on the Pacific, and the latter in an Atlantic attack." The resolution added that "a former executive officer at the close of a three-year tour stated that, 'from the standpoint of war (and military aviation is not needed unless there is a possibility of war), every dollar that has been or will be spent at France Field is wasted."

"There should be a base or bases out in the interior; Casa Larga, near the new dam, is a good place. It has big meadows, and we could land hydroplanes near by in the new lake, too. There are good approaches, and it is out of easy sight."

Legionnaires declared it would appear to be clear that it would be highly economical for the War Department to develop one large base in the Canal Zone at some point midway between the oceans, which are approximately forty-five miles apart.

This plan, it was said, would comply with a General Staff theory that Army aviation bases should be from fifteen to forty-five miles behind the lines. Under present conditions, said the resolution, the fields are virtually or entirely in front of anti-aircraft protection and the vital points at the canal's entrances.

"Military maneuvers here for several years have all been held at distances many miles closer to these fields than it takes a bombing plane to travel in attaining proper altitude while flying to its mission. Apparently invading planes could and would include these bases of aviation when en route to bomb the locks and spillways and other sensitive points. The bases would even be under shellfire at times. In 1926 the invading infantry 'captured' France Field from the rear and east flank."

Copies of the resolution were forwarded to the Canal Zone Governor, the National Legion headquarters, the chairman of the National Aëronautical Committee and the Assistant Secretaries of War and Commerce for Aviation urging their support.

The Canal Zone, the resolution declares, has become the most important operating base for air traffic between the United States and South and Central America, and says: "Proposals that the principal isthmian commercial airport should be located in the Canal Zone rather than in the Republic of Panama seem obvious when it is considered that in the event of hostilities it would be highly desirable to have airports in the Canal Zone under absolute control of the government." It points out it would be desirable to have the two commercial airports in the zone, one on the Atlantic, the other on the Pacific terminus.

Legionnaires said there were several reasons why the main airport should be on the Pacific side. The average rainfall is nearly double on the Atlantic side than that of the Pacific side, and torrential rains for eight months make for low or practically no visibility on the Atlantic side. The capitals of the Canal Zone and Panama are on the Pacific side, and most of the mail traffic originates there; also the Pacific side is fifty miles nearer Buenaventure, Colombia, on the south.

"The only desirable site for a commercial airport on the Pacific is Albrook Field for land planes," the resolution states.

Aviation Progress in Italy

The Baltimore *Sun,* August 11.—By Andrue Berding.—The cruise of thirty-five big Italian bombing planes to the Eastern Mediterranean and the Black Sea, and the annual

report of General Italo Balbo, Undersecretary of Aëronautics, have combined to reveal again Italy's astonishing growth in aviation.

The country of Ferrarin and Del Prete and Major de Bernardi now occupies one of the chief levels in European military aviation strata, only a little behind France, ahead of Germany and the equal of England. In another few years Italy may be leading all Europe in military and naval aircraft.

At the same time, her commercial aviation is moving quickly forward. Within the past year several new lines, land and water, have been opened. Overcoming her geographical difficulties—namely, a mountainous backbone running down her long torso—Italy is connecting all her major cities with passenger and mail lines.

Local newspapers print timetables of the airlines as they do the schedules of the railroads. Nine lines run out of Rome, north, east, south and west, across land and across water. Every day a seaplane starts from Ostia, Rome's old seaport, and flies across the Tyrrhenian Sea to the Island of Sardinia. Every day another plane arrives from the island. From the same point seaplanes leave for the long flight up the coast to Columbus' City, Genoa. In the same direction seaplanes depart for Barcelona, Spain, and fly along the Ligurian coast, past celebrated Monte Carlo and Nice; or in the opposite direction to Naples, Palermo, and Tripoli, in North Africa. Land planes take off from the Littorio Field, a few miles away, for Milan, Venice and Vienna, or Bologna.

Throughout Italy a similar activity in commercial flying is constantly going on. Italian planes link the eastern and western Mediterraneans, unite the old civilizations of Rome and Greece, connect two continents, Europe and Africa, and bind Latin and Nordic Europe.

General Balbo reported to the Chamber of Deputies that in 1928 six new lines, and in 1929 another six, were put in operation. The total of miles covered by the air lines doubled in one year from 4,000 to 8,000.

The new line from Genoa to Marseilles gives direct mail communication by air from Rome to Paris and London. Italy is likewise on the line from London to India. A new accord with the French Air Minister, signed only a few weeks ago, assures Italy air communication with her own planes from Italian points to Tunis, where thousands of Italians are living.

The Government of Mussolini is doing all it can to encourage civil aviation. In 1927 the Government advanced $1,750,000 and in 1928, $2,500,000 for that purpose. The present budget calls for $3,400,000. The Government, moreover, has encouraged the formation of air touring clubs, and has ordered the construction of 500 touring planes, called aëromobiles, of standard type, to be put at the disposal of the clubs.

With reference to military aviation, General Balbo did not reveal numerically the strength of the Italian Air Service, but a number of incidents have disclosed it as remarkably large. The fact that Italy holds the world's records both for speed and distance augurs that the mechanical side of her air fleet is well forwarded.

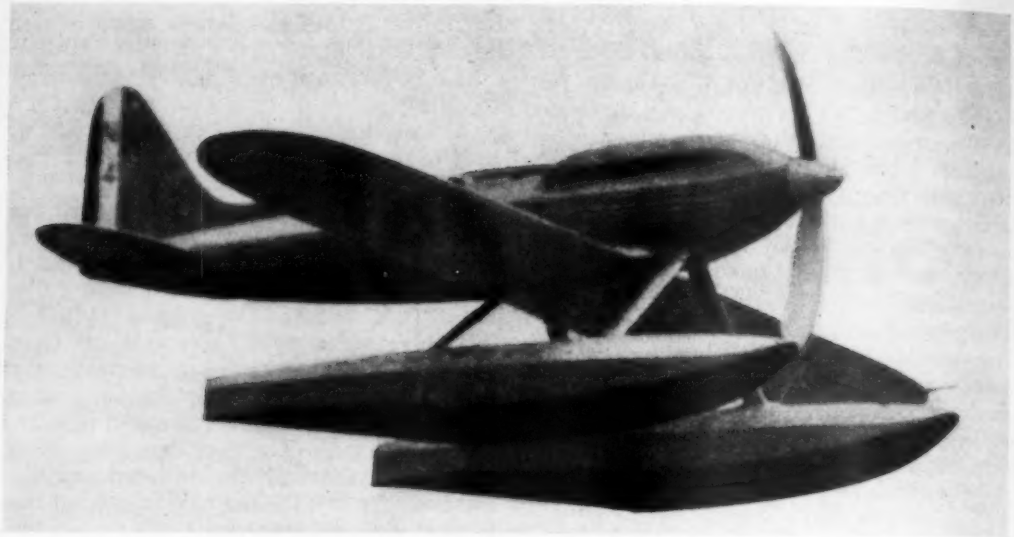
The cruises taken to both ends of the Mediterranean and to England by her bombing fleets forecast their ability to cover long distances without mishap.

Italian pride in all this was reflected by General Balbo when he said that the "army of the sky," as it is called here, "constitutes by order of the Duce the most perfect instrument of power Italy possesses."

The Supermarine S-6 British Schneider Cup Entry

The Army, Navy and Air Force Gazette, August 15.—The *S-6* is slightly larger than the *S-5*, the winner in 1927, and it is questionable whether it has attained the same degree of beauty. There is no question whatever as to the skill with which the designer has achieved cleanness of line. The belief of some that the machine will be able to maintain an average speed of 315 miles or more over the triangular course of the race may be justified. There are many special points of interest about the new machine. The petrol supply is housed in the floats—in 1927 one float only held the fuel. The lubricating oil fills the hollow tail fin which acts as a cooler. The cooling water for the engine runs through smooth surfaced duralumin radiators built into the wing surface. In this position they take their share of the load and offer no additional resistance.

The supercharged Rolls-Royce engine fitted is a direct development of the 830 h.p. Rolls-Royce "H" type engine which was on show at the Olympia Aëro Exhibition. It



THE SUPERMARINE *S-6;* BRITISH SCHNEIDER CUP ENTRY

was designed by Mr. F. H. Royce and has been produced during the past six months. It is a V-type engine with its cylinders disposed in two banks of six.

The Navy "ZMC-2" All-Metal Dirigible

Aviation, August 17.—The *ZMC-2* is 150 feet long and 52 feet in diameter giving a fineness ratio of approximately three to one. It will hold 200,000 cubic feet of gas, and its control car has accommodations for a crew of four. The ship will get propulsion from two Wright J-5 engines, and is expected to have a high speed of more than 60 m.p.h., with a cruising range of approximately 600 miles.

Three distinctly radical departures from conventional lighter-than-air craft construction feature the design of the *ZMC-2.* It is all metal, except for the balloonets within the gas bag by means of which the gas pressure is controlled. It is fitted with an entirely new control method, having eight fins around its tail and using four of them as rudders and elevators. These fins are set 30 feet forward of the tail to increase stability. Finally, it has an unusually low ratio to fineness for an airship of its size.

The *ZMC-2* was not designed to be a craft with any commercial possibilities. Rather, it was built purely as an experiment and as having a considerable number of military, naval and scientific uses. However, it is claimed by the builders that the gauge and strength of the alclad going into it are such that the same type of craft can be produced several times the *ZMC-2's* size without increasing the width or weight of the metal per square inch. The skin's gauge is .008 inch.

The Aircraft Development Corporation, builders of the ship, was used as a nucleus around which the $20,000,000 Detroit Aircraft Corporation was organized here recently. The *ZMC-2* cost approximately $1,150,000 to build and is going to the Navy for $300,000.

MISCELLANEOUS

Will U.S. Cruiser Bill Aid Naval Reduction?

Baltimore *Sun,* by Hector C. Bywater.—London, August 15.—From the news received here it is clear that American big-navy proponents are perturbed by recent events. Their anxiety is comprehensible enough. After the strenuous campaign that eventually brought the fifteen-cruiser program through Congress it would certainly be heartbreaking to the sponsors of that measure if it were emasculated as the result of some new disarmament pact with other powers.

I must confess myself in sympathy with those American naval critics who declare the

carrying out of this program in full to be a *sine qua non*. With twenty-three 10,000-ton cruisers assured (eight already are building), additional to the ten 7,500-ton ships in service, the uneasiness of the Navy Department with respect to the cruiser situation would doubtless be allayed.

Nor does any reasonable person consider thirty-three heavy cruisers an excessive force for American naval requirements. I, personally, hope the fifteen projected cruisers will be duly built. Their construction, so far from hindering the new movement for fleet reduction, will help it along. This for two reasons:

First, as I have said, completion of the program, by substantially improving America's relative status in this type of ship, would cut much of the ground from under the propagandist, the scaremonger and the international mischief-maker. Secondly, it would bring America's heavy-cruiser fleet to within measurable distance of the British, and thus provide a rational basis for the future quota of total tonnage to be possessed by each navy.

If, on the other hand, the American program were cut, what would be likely, nay, certain, to follow? Another tidal wave of propaganda or "indoctrination," irrespective of whether a new treaty had been signed, and a claimant demand that, since America could not or would not build up to the British cruiser level, Britain must reduce down to the American level. That demand, we are interested to note, is already being put forward by American politicians of such widely different temperaments as Representative Fred Britten and Senator Borah.

Sagacious as both these gentlemen are, neither seems to realize that what they are suggesting amounts, in effect, to a demand that the British Empire should henceforth reduce its naval strength to a standard dictated, not by the necessities of empire strategy, but by the exigencies of American domestic politics.

Frankly, this cannot be done. Let us pursue the argument to its logical conclusion. America has now, of modern cruisers, ten built, eight building, fifteen authorized. Let us assume that, in consequence of a new treaty, five of the authorized ships are dropped. That would give America a total of twenty-eight cruisers, displacing collectively 255,000 tons. On the principle of mathematical parity the British Empire (not Great Britain alone, be it remembered) would be alloted the same amount of tonnage. Up to now we have actually launched and will complete thirteen cruisers of 10,000 and two of 8,400 tons—146,800 tons in all. Being left with a margin of only 108,200 tons, we should have to scrap a good many of our existing cruisers, and when the time came to replace antiquated ships we could build only fifteen new ones, even if the displacement were kept at 7,000.

That means the empire would have at most thirty cruisers, half of which would be no match for the larger and more heavily gunned vessels which, in case of war, would prey on our trade.

No British Government, I venture to say, would dare to submit such a proposition to its own people, let alone the peoples of the overseas dominions, who have a very lively appreciation of sea power as the cardinal condition of their existence. So when Messrs. Borah and Britten tell us that we must stop all cruiser building and also scrap a lot of the ships we now have, we are tempted to advise them to look at a map of the world, with special reference to the maritime trade routes.

We are all agreed upon parity, and it does not matter supremely whether that parity is to be mathematical or elastic. But common naval strength must be fixed by some formula not too remote from common sense. I will not repeat the familiar arguments about Britain's utter dependence on imported food and raw materials, in contrast to America's virtual independence thereof, nor reiterate the patent truth that the scattered members of the British Empire are held together only by the cement of sea power. But the facts are there; they cannot be contested.

During the past hundred years several British Governments have fallen and parties have been disrupted because the country feared they were tampering with naval defense. Mr. Ramsay MacDonald is not likely to make such an elementary mistake. In the sixties of last century a witty but cynical Frenchman observed that there were three things an Englishman allowed no one to meddle with: his navy, his sport, and his wife. The sequence may have been unjust, but it points a moral.

All of which brings us back to the necessity of discovering some sensible yardstick

with which to measure and control the future strength of the British and American fighting fleets. It should be quite easy to do this, granting just a little of that good will, faith in the other fellow's motives and appreciation of his problems which statesmen are constantly enjoining us to show.

Of course, it will not help matters if, every time Great Britain cancels a cruiser, a cry of "British chicanery" goes up in certain sections of the American press. Suspicion begets suspicion, and the continual repetition of the fable that Britain "swindled" America at the Washington conference (*vide* a recent issue of a prominent Washington service weekly) may explain the fact that a great many British people are now firmly convinced that at that very same conference, America cutely traded a herd of unwanted and never-to-be-completed battleships of the "white elephant" class in return for the prize of naval parity with the British Empire and decisive superiority over Japan. Grotesque as it may sound in American ears, this thesis could be demonstrated every whit as plausibly as the argument that America was hoodwinked.

Not long ago *The Sun* remarked, editorially, that big-navy champions were more numerous in Great Britain than in the United States. I venture to disagree. Big-navy influence here—influence, that is, inimical to an agreement with America—is absolutely negligible. But as regards the necessity for an adequate navy for the protection of the national food supplies and the conservation of the empire, nine-tenths of the people are absolutely solid for it.

And it is probable that Labor statesmen, being, as they claim, in closer touch with the common folks, realize this truth even more clearly than their Tory predecessors, and will act accordingly.

Don't Scrap the "Olympia"

Washington *Post,* August 28.—One of America's most historic vessels is in danger of being scrapped for junk. A board of inspection has reported to the Secretary of the Navy that the best interests of the department would be served by removing the *Olympia,* famous flagship of Admiral Dewey in the battle of Manila Bay, from the Navy list. The vessel is no longer of military value, and its only commercial worth would be for scrap. Unless some action is taken to preserve the ship for its historic value it faces destruction.

The *Olympia* has a dual historic significance. It symbolizes the victory of the United States in the Spanish-American War, and it is invariably connected with the participation of this country in the World War. It served as the flagship of the American fleet in Russian waters, and after the close of hostilities it transported to America the body of the Unknown Soldier. Only the eloquence of a poet is needed to give the *Olympia* a place beside "Old Ironsides" in the heroic traditions of America.

Representative Cochran introduced a bill last year to make a permanent memorial of the *Olympia.* He would have the ship preserved and protected at Hains Point or some other location on the Washington water front where all visitors to the National Capital may see it. It is understood that the project has the approval of the House naval affairs committee, naval officials, and the National Capital Park and Planning Commission, but the bill has lodged in committee without action. Now that the vessel appears to be in actual danger of scrapping, some committee members are bestirring themselves to head off the move.

The United States is too careless with its objects of historic interest. In this period when the Government is fostering development of shipping, it is particularly appropriate that one of the most famous vessels that ever flew the American flag should be preserved. Only a nation devoid of sentiment and pride in the achievements of the past could permit scrapping of the *Olympia.*

NOTES ON INTERNATIONAL AFFAIRS

From August 4 to September 3

Prepared by Professor Allan Westcott, U. S. Naval Academy

NAVAL LIMITATION

MacDonald Visit in October—At the close of August it appeared probable that the visit of Premier Ramsay MacDonald in Washington for discussion of naval limitation might occur as early as the last week in September, immediately after the session of the League Council and Assembly. Negotiations at this time between the United States and British governments had reached the point of fairly definite written proposals, and were spoken of as in a "crucial phase," efforts being centered on the difficult problem of attaining President Hoover's aim of real naval reductions, while still maintaining the principle of parity accepted by both governments, and without much scrapping of ships still capable of useful service. According to a dispatch of August 27, a possible solution which the two governments were considering was that of securing curtailment not by actual scrapping but by retiring cruisers as fast as they reach the age limit and failing to replace them with new tonnage or only partly replacing them.

Whether the conference to follow these elaborate preparations would be a five, three, or two power conference remained uncertain. London opinion inclined to the view that Japan would take part, but that both France and Italy might decline, as was the case at the abortive Geneva meeting of 1927. The view of the French press was that such a conference would be a failure if the lesser naval powers were to be met with a rigid formula and expected to accept it by merely "signing on the dotted line."

HAGUE REPARATION CONFERENCE

Agreement Reached—After a three weeks' session marked by intense bitterness of feeling and stubborn wrangling over matters not seemingly of vital importance, the conference of twelve nations which met at The Hague on August 6 for political action on the Young Plan ended at the close of August in compromises and agreements which will permit the plan to go into effect on November 1 without radical change. Chief among the decisions reached were: (1) A compromise, involving financial sacrifices chiefly on the part of Germany, by which Great Britain will receive about 80 per cent of the $11,000,000 additional reparation payments demanded by Chancellor of the Exchequer Snowden; (2) Evacuation of the Rhineland to be completed by June 1, 1930, eight months from the close of the conference. Germany will during this remaining period meet half the cost of maintaining the allied troops (for which a pool of 60,000,000 marks is created) and all the cost of evacuation. The important question of the location of the international bank is left to a special committee which will report at another session of the conference. It was expected that this next session would be held in about a month's time.

To emphasize the spirit of conciliation which marked the close of the conference, as contrasted with the animosity preceding, the British delegates agreed that British troops should remain in the Rhineland as long as those of France. Earlier in the month the British government had made a sudden and to Premier Briand disconcert-

ing, announcement that evacuation of the 6,000 British troops would begin at once and be completed by the end of the year, regardless of whether the Young Plan came into effect next month, next year, or never.

British Demands—If Chancellor of the Exchequer Snowden came to the Hague Conference bent on demonstrating the vigor and aggressiveness of British handling of foreign affairs under Labor rule, he unquestionably accomplished his purpose. And that this was his purpose was clearly manifested by his statement in the course of the debate: "The prestige of England is at stake. Our foreign policy in the last few years has been so weak that the time has now come for England to resume that place in international relations to which her position in the world entitles her. Other nations have taken advantage of England's weakness. The moment has come to change all that."

On the first day of the conference he made a statement of the British demands, which he declared must be met without compromise or England would throw overboard the whole plan so painfully worked out at Paris. As stated more specifically later, these demands were as follows:

First—Great Britain to get 45,000,000 marks (about $10,800,000) yearly more than allotted to her under the Young Plan and which Mr. Snowden estimated she should receive under the application of the Spa percentages.

Second—Great Britain to get 80,000,000 marks (about $19,200,000) annually from unconditional German payments.

Third—Reduction in the amounts of German payments in kind; a guarantee against the re-exportation of these payments and an assurance that the international bank will not finance German deliveries in kind in a manner to increase them.

Fourth—Italy to agree to buy a fixed amount of English coal annually.

Only the first of these demands presented apparently insuperable difficulties, since it required readjustment of the complicated mechanism of the Young Plan so as to produce from somewhere an additional $11,000,000, either by increased payments on the part of Germany or sacrifices on the part of the other creditor nations. Ultimately the seemingly impossible was accomplished, as indicated above, but only after a series of offers and refusals, which, according to press reports, "poisoned the air" of the conference, and came close to wrecking the Entente Cordiale. Judging from the French press, French sentiment was for the movement more drawn toward Germany than England. "Mr. Snowden," said *La Liberté*, "may perhaps return to England with the prestige of a national hero, but we can assure him that history will not endorse the popularity which he is now tasting with such unhealthy joy. In effect, unless there is some sudden event or change in the whole aspect of The Hague conference, the British Chancellor of the Exchequer will have accomplished the destruction of the Entente Cordiale and has even rendered difficult Franco-British cooperation which is as useful to Britain as to us."

Throughout the negotiations the British demands were strongly supported by all parties and all sections of the press at home. The more conciliatory spirit which was expected to follow the advent of Labor rule in England was not at all manifest at The Hague.

NEAR EAST

Arab Uprising in Palestine.—Fierce attacks by Arabs on Jews in Jerusalem, Hebron, and other parts of Palestine, began on August 23 and continued for several days until order was finally restored by British police and soldiers, strengthened by forces rushed to the scene from Egypt and other Mediterranean bases. According to casualty lists of August 29 those killed in the course of the fighting included ninety-six Jews, fifty-two Arabs, and four Christians, with over 260 severely wounded. About seventy-five Jews were killed in a brutal massacre at Hebron, most of them students in the Hebron Rabinnical College. The victims included eight Americans killed, all of them students at Hebron, and fourteen injured.

Evidence indicated that the uprising, occurring almost simultaneously at various places, had been planned beforehand by Arabian leaders, and was not solely an outbreak of race and religious hatred but a manifestation of the intense feeling aroused among the Arabs of Palestine, who constitute about nine-tenths of the population, by the post-war policy embodied in the "Balfour Declaration" of establishing a Zionist State in the Holy Land. Among Jews throughout the world, and especially in this country, there were mass meetings and vio-

lent criticism of the British Government, holding mandatory power in Palestine, for failure to anticipate the uprising and feebleness in its suppression. From sources ordinarily opposed to military and naval preparedness, England was loudly blamed for not holding the country under firmer military control. It was believed that the prompt action of the Labor Government in despatching not only troops but a strong naval force—including eighteen naval units—was intended in part to restore the injured British prestige throughout the Islamic world. At the close of August there appeared little immediate danger of further trouble in Palestine or spread of the movement to other Mohammedan sections of the empire, but the hostile feeling engendered will require stronger military measures in these regions for a long period to come.

NEW OFFERS TO EGYPT.—Early in August King Fuad of Egypt and his prime minister Mohammed Mahmoud Pasha left London carrying with them proposals for a new Anglo-Egyptian treaty of friendship and mutual aid. The proposals embodied the extreme concessions the British were willing to make in the hope of securing acceptance on the part of Egyptian Nationalists. The proposed treaty contained eighteen articles. First came a sweeping declaration, "Military occupation of Egypt by the forces of his British Majesty is terminated." Subsequent clauses disclosed that this really meant that British troops maintained in Egypt for the defense of Suez were to be transferred from Cairo and Alexandria to the immediate vicinity of the canal. Other clauses provided that England should surrender responsibility for protection of foreign interests in Egypt, replace the present high commissioner by a regular ambassador, and support Egypt's application for league membership as well as her efforts to terminate the capitulatory régime as regards foreign inhabitants. Egypt will promise to employ British financial and judicial advisers, and British instructors for army training if such are needed. Both nations pledge themselves to concerted action in case of difficulties with a third power, and to mutual aid in case either becomes involved in war.

What the treaty really does is simply to soften down the terms of the protectorate over Egypt which England has maintained for fifty years.

FAR EAST

BORDER CLASHES IN MANCHURIA.—Through August the press carried daily news of conflicts between Russian and Chinese forces along the Manchurian frontier, in which villages were seized, gunboats fired on, and casualties were reported as running into the hundreds. Typical of these affrays was the fighting near Manchouli, in which forty Chinese were reported killed and 300 wounded; and another clash near Pogranichnaya in which the wounded were twelve Chinese, two white Russians, and five Red Russians.

Despite these hostilities, which in days before the Kellogg Peace Treaty might easily have been called war, diplomats experienced in Eastern affairs were still skeptical as to whether either Moscow or Nanking were ready to proceed to extremities. Though the game of diplomatic recriminations and military demonstrations was admitted to be dangerous, it was pointed out that the actual fighting was chiefly on the part of irregular bands, and that neither in China nor Russia was there a public opinion able to stampede a reluctant government into war. Nanking, it was believed, had stirred up the Russian crisis partly at least as a means of retrieving President Chiang Kai-shek's waning popularity in Central China, and also of extending the Nanking authority into Manchuria.

At the close of August China still stood firm in her refusal to restore the status quo in regard to the Chinese Eastern Railway, negotiations were at an impasse, and war still seemed well within the range of possibility.

MOBILIZATION OF TROOPS.—According to August reports from Manchuria, Marshal Chang Hsueh-liang, the young Manchurian dictator, had mobilized an army of over 100,000 and was moving it toward the frontier, acting throughout in coöperation with Nanking, which had sent General Ho Chen-chin as President Chiang's personal representative to take part in the direction of military operations.

Gen. Blücher-Galen, reported as identical with the Soviet officer formerly active in training the Chinese Nationalist Army, was assigned to command of the Soviet forces in Siberia, and at the close of August had established his headquarters at Habarovsk and completed his plans for hostilities. Military authorities believed there were not more than

30,000 Soviet troops east of Lake Baikal, and that it would be difficult to move much greater forces into Manchuria and maintain them there. China could meet such an advance with perhaps 150,000 men, but the Russian superiority in aviation, artillery, equipment, and training might still prove decisive. In the background remained the certainty that Japan would take a hand in the event of any real threat of extension of Soviet power.

China's Defense of Rail Seizure.—A communication from the Chinese Nationalist Government addressed to all signatories of the Renunciation of War Treaty and made public on August 21, put China's defense for seizure of the Chinese Eastern Railway on the ground of widespread communist activities on the part of the Soviet Government. A summary of the note as given in the New York *Times* of August 22, follows:

"The Chinese Government declares that documentary evidence in its possession proves that the Union of Socialist Soviet Republics has been plotting the overthrow of the Chinese Government, using the Chinese Eastern Railway and other Soviet-controlled or influenced institutions to further 'the nefarious schemes' of the Bolsheviki.

"Since 1927, the Chinese Government declares, Russia has been conducting communistic propaganda in China, using the funds of the Chinese Eastern Railway to finance these activities, which involved, it is charged, not only the overthrow of the Chinese Government but the destruction of China's political and economic system.

"These activities, it is asserted, have progressed to a point where the safety of China is endangered. China also charges Russia with sponsoring a policy of wholesale assassination, one of the purposes of which was to bring about a world-wide revolution.

"In the present crisis on the Manchurian frontier, Russia, the Chinese assert, has been making warlike threats, involving not only firing into but the operation of military airplanes over Chinese territory. China, says the communication, still hopes for peace, but adds that, 'should such acts of provocation on the part of the Soviet Government result in unavoidable clashes arising out of China's determination to defend her own rights, the responsibility for disturbing the peace of the world must entirely rest with the Soviet Government.'"

Pacific Conference at Kyoto.—The next session of the Institute of Pacific Relations, the last meeting of which was held at Honolulu, will convene at Kyoto, Japan, this coming October. Jerome D. Greene, of the firm of Lee Higginson and Co., who succeeded Ray Lyman Wilbur as chairman of the American Council of the institute, stated that there would be about forty American delegates present. Mr. Greene sailed for Europe in August intending to visit Moscow on the way to Japan and make a special effort to secure Soviet representation at the conference. At Kyoto there will be round-table discussions of the Manchurian problem, Chinese treaties and finances, Japanese population and land questions, diplomatic relations in the Pacific, and other problems relating to the Pacific and the Far East.

Chinese in Manchuria.—Whatever nation ultimately exercises political and economic control in Manchuria, its population and culture will be Chinese. A recent bulletin of the National Geographic Society describes the tremendous Chinese migration of over a million a year into this northern province, and its rapid economic development. According to the bulletin, Manchuria today rolls up more than one-third of China's exports. More than half of China's railway mileage is in the province. Dairen, its chief port, has risen from thirtieth to third among Chinese ports, and in 1928 handled over eight million tons of imports and exports, with a total shipping greater in tonnage than that of any United States port except New York. "Manchuria," the *Bulletin* continues, "in terms of people is not so pleasant to look upon as Manchuria in terms of figures. The immigrant arrives at Dairen with his family on a steamer packed tighter than an African slave ship. He has left behind the home and farm of his ancestors, and, what is more painful to a Chinese, the graves of his ancestors. In his old home he was ordered by the government to grow poppies for opium. When the crop was ripe the bandit-governor seized the crop as illegal, and confiscated the land for violation of law. The farmer's son was forced into the Governor's army. Famine threatened slow death. There was one hope—Manchuria.

"He sold his eldest daughter to pay for passage, $1 per person, on a Japanese steamer. With his wizened old father mounted on his shoulders, he fought his way

on board. They stood or squatted throughout the voyage. There was no room to lie down.

"A happy settler lives twenty miles from Taonan, which the railroad reached last year. His one-room house, half sunk in the ground, has kaoliang (sorghum stalk) sides covered with mud and sod. Sometimes he cannot see the sun because of dust storms blowing out of Mongolia. He has to sell his bean crop for depreciated currency. But he and his family have beans to eat. He was able to pay the railroad a little on the land he took from them. The summer is short, and he dreads the winter. In January it often goes fifty below zero. Still Manchuria is paradise compared with famine-ridden, tax-ridden, bandit-scourged Shantung.

LEAGUE ACTIVITIES

COUNCIL AND ASSEMBLY SESSION.—The fifty-sixth session of the Council of the League of Nations opened August 30, under the presidency of the Persian delegate, most of its leading members being still absent at The Hague, though expected to arrive at Geneva a day later. The League Assembly opened on September 2, and the ceremony of laying the corner stone of the new $5,000,000 League building at Geneva was set for September 7.

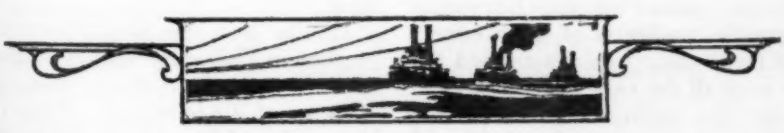
ARMS SESSION FUTILE.—Prior to the Council session at Geneva there was a meeting of the special committee for drafting a convention on manufacture of arms and munitions of war. Nothing was accomplished, the chief stumbling block being differences of opinion as to the application of the convention's publicity provisions not only to private firms but to state munitions factories. Japan, which has only state factories, declined to give information except in general terms of values, which was conceded to be no real information at all.

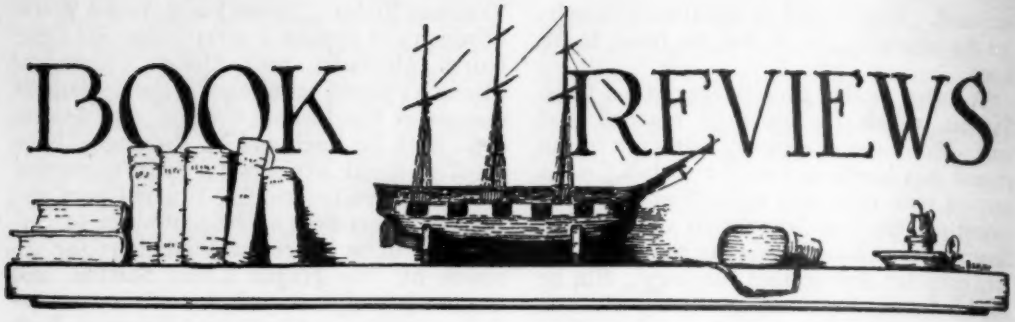
WORLD COURT JUDGES.—For the vacancies in the World Court created by the death of Viscount Finlay (British) and André Weiss (French), it appeared certain that Sir Cecil Hurst (British) and Henri Fromageot (French) would be selected at the September session of the League Council and Assembly. Both Sir Cecil and M. Fromageot have acted as legal advisers to their respective foreign offices before The Hague Court and both were members of the committee of jurists that drew up recommendations for revision of The Hague Court Statute, and terms of acceptance of American reservations regarding entrance into the court. Both have been nominated by Great Britain, France, and other leading powers.

AMERICAN AFFAIRS

ARBITERS FOR "I'M ALONE" CASE.—In August Justice Willis Vandevanter of the United States Supreme Court and Eugene Lafleur, a Montreal lawyer, were named to act as commissioners for the United States and Canada in arbitrating the questions arising from the seizure of the rum-running schooner *I'm Alone* off the Louisiana coast last March. Both governments are understood to have emphasized the desirability of complete findings on the points at issue, which involve far-reaching questions of international law, notably whether "hot pursuit" may begin outside the three-mile limit, if within an hour's steaming distance from shore, and whether the pursuit in this specific case was continuous and the destruction of the ship warranted.

PARAGUAY-BOLIVIA BOUNDARY.—The international commission for settlement of the Paraguay-Bolivia boundary dispute was reported from Washington in August to be considering a line of demarcation through the Chaco from Port Leda on the Paraguay river to El Hito on the Pilcomays river, which would give to each nation parts of the territory in dispute. Meanwhile the two countries have agreed in principle to mapping of the proposed line by aerial photography.





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FAMOUS OLD-WORLD SEA FIGHTERS. By Charles Lee Lewis. Boston: Lothrop, Lee and Shepard Company. 1929. $3.00.

REVIEWED BY CAPTAIN THOMAS G. FROTHINGHAM, *U.S.R.*

It was a good idea for Professor Lewis to present this review of warfare on the seas in the form of a series of short accounts of the outstanding naval commanders of all time. The successive pictures reflect in a vivid way the shifting of world conditions, the changes in fighting, and the progression of types of fighting ships throughout the ages. The result, in itself, is a history of sea power that is told with a renewed interest in each episode.

The Mediterranean was the pulsing heart of the old world, and Phormio is chosen to typify the Greek era of control, which was thrown away in the suicidal fights among themselves. With the Romans it was the other way, and Agrippa's victory at Actium cemented the Roman Empire.

The contrast was great, in the career of Olaf and his vikings of the northern seas, and the magnificent fleets of Barbarossa in the Mediterranean. But the victory of Drake and his fighting mates over the Armada proved that the school of the Norseman could outfight the graduates of the Mediterranean, and these daring spirits carried the British flag over all the seas of the world.

Then came the stern assertion of the British nation under Cromwell, who found in Blake one of the great admirals of all time. It was not until after Blake's death that De Ruyter became what Mahan called "the foremost figure, not only of the Dutch service, but among all the naval officers of that age." The account of De Tourville gives the story of the challenge of France as a naval power under Louis XIV. With the advent of the French Navy, there came the great advance in naval construction to the stately warships of the eighteenth century, which was the most picturesque of all the times of sailing ships.

Then came Hawke, "the founder of a school of naval officers among whom Rodney, Keppel, and Howe were worthy disciples." He was the leader in victory for Pitt in the Seven Years War, in which the sea power of Great Britain was the deciding factor, and which first placed Great Britain in command of the seas. Hawke "revolutionized ideas, raised professional standards, and thereby both affected the result in his own time, and perpetuated an influence, the effect of which was to be felt in the gigantic contests of later days." This praise from Mahan, quoted by Professor Lewis, is a just appreciation of Hawke. With him tactics improved to correspond with the advance from the unwieldy warships of the sixteenth century.

Hawke was the lion of his times. His exploit in Quiberon Bay will always stand out among deeds of daring in naval warfare. A letter of his is quoted: "For God's sake, if you should be so lucky as to get sight of

the enemy, get as close to them as possible. Do not let them shuffle with you by engaging at a distance, but get within musket shot if you can."

De Grasse has been chosen to typify the period of the alliance with France, and the inestimable assistance rendered by the French Navy in the American Revolution. Before the arrival of De Grasse's fleet on our coast, British command of the sea had been absolute. The coöperation of the French fleet made Yorktown possible. And Professor Lewis has truly stated that his "defeat at the hands of the British at Saints' Passage, left no stain of dishonor or cowardice on his name." The account of another French admiral of that period should be read by all, for the career of De Suffren is comparatively little known. It is worthy of study by all students of naval affairs.

Then follows the story of Nelson, who marked the zenith of the sailing admiral. Aside from his own genius, we must never forget that Nelson was the product of his times, which had produced a new school of sea fighters. It was a parallel case to that of Napoleon in the same era. Each stood out among his fellows, because each was the best of a new school.

But Nelson's school went more quickly into the past than anything ashore, for the change to armored warships was more revolutionary than anything that had happened on land. The next picture is the Battle of Lissa, the first European battle between ironclads. It is true that these first armored ships of Europe, with their clumsy hamper of sails, gave false ideas of the value of the ram in their lumbering maneuvers—and this was a drag on European naval construction for years. But, nevertheless, it was the end of "wooden walls."

The transition to the East, and to the victories of the Japanese Navy, brings into view a complete change of types as well. The last stand of the sail, as a useless auxiliary of the armored warship, had been ended, and the fighting ships were all the progeny of the *Monitor* of the United States Navy. Other nations had been reluctant to accept the doctrines of the *Monitor*, as the Battle of Lissa bore witness. But at the beginning of the twentieth century the types of Lissa were as obsolete as the types of Nelson's warships. The vogue of the ram had departed with the rest of the hamper.

Admiral Toga, the father of the Japanese Navy, will always deserve a high place in naval annals, for he first demonstrated the possibilities of a modern fleet of armored battleships at high efficiency. The way in which the Japanese smothered the Russian fleet was most impressive.

Next comes Professor Lewis' picture of the World War, and here the author has not been fortunate in his record. For he has taken the statements written about Admiral Beatty by his indiscreet partisans, in the controversies that have raged since the war, instead of the official recorded facts. These advocates have travestied the accounts of the Dogger Bank and Jutland.

But this is only one defect, and the book is a notably valuable contribution to naval literature.

ELEMENTS OF NAVIGATION. By W. J. Henderson, revised by E. B. Collins. New York: Harper & Brothers. 1929.

REVIEWED BY COMMANDER R. E. ROGERS, *U. S. Navy*

This book is a small and convenient text; explanations of methods are brief, clear, and to the point. On the unfavorable side, some of the methods and appliances described are either obsolete or on the verge of becoming so. These obsolescent items include points and quarter points, the calculated traverse, the chip log, Airy's method for the great circle, and the time sight; and while the more modern counterparts of these are in most cases included, the proportion of stress on older methods will likely prevent the book being classed as up to date, at least from the point of view of officers of the Navy.

WE BUILD A NAVY. By Lieutenant Commander H. H. Frost, U. S. Navy. Annapolis: United States Naval Institute. $4.

REVIEWED BY REAR ADMIRAL BRADLEY A. FISKE

In *Herald-Tribune*, New York

This is an old-fashioned tale of the sea; a tale of frigates and brigs and ketches and schooners and privateers and fire ships; of cutting-out expeditions and hand-to-hand

fights with cutlasses and one-shooter pistols; of perfectly stunning victories by young Americans; of triumphs over the elements of wind and storm and tide, coincidentally with triumphs over hostile men.

In the first part of the book, which covers the main activities of the United States Navy during the War of the Revolution, Commander Frost devotes most of his admirable powers of narrative and description to the deeds, and not only the deeds but the character and the peculiarities of that amazing personage, Paul Jones. Born in Scotland, denied even a father of the locatable type by some, a veritable sea-rover if ever there was one, commanding only very small vessels, accomplishing little of really great value of a material sort, dying in obscurity and poverty in Paris at the early age of forty-five, Paul Jones achieved a naval prestige second to that of Nelson only in this day; and his bust now stands in our Hall of Fame.

When one reads Frost's account of what Jones did, one feels inclined to doubt it. What Frost says Jones did seems quite impossible. How could one little man, commanding only a very few miserable, purchased vessels of ill-sorted kinds, with only half-trained officers and half-mutinous crews of Americans, Englishmen, Portuguese, Irishmen, Swedes, Scotchmen, Italians, Swiss, Frenchmen and others whose nationalities could not be identified—how could he keep the wonderful British navy all agog so long and finally sink H.M.S. *Serapis* in single combat? Clearly he could not.

But he did!

Frost shows how the nation let the navy drop down almost to zero after the War of the Revolution ended, and how Jefferson tried to keep it down; but how the attacks on our merchant ships in the Mediterranean by the pirates of the Barbary Coast became so wholly unbearable that the fine frigates *Constellation, Constitution* and *United States* were built and sent to fight them, and how, later, other vessels were built and sent out there also.

It is an exciting picture of the fights at Tripoli that Frost gives; of the ruthless attacks on our merchant ships; the imprisonment of surviving sailors of those merchant ships in unspeakable dungeons and the enforced ransom of them by the United States through the medium of disgraceful "tributes" of money. He tells how this system of blackmail was covertly supported by England, who, shortly after the Revolution, began to take practical measures to embarrass American sea trade, which England realized was beginning to rival her own sea trade. He tells how the naval operations which finally overcame and ended the blackmail system were continually hampered by the well meaning but not well conceived plans and the not well conducted operations of our diplomacy.

The most spectacular incident of this period was the recapture and burning of the Philadelphia by Lieutenant Stephen Decatur, now pictured on the screen in many moving-picture houses as part of the story of "Old Ironsides," the pet name of the U.S.S. *Constitution*. But it was only one of many almost equally daring and successful adventures that finally brought to terms "the barbarious Moors not only of Tripoli but of Morocco, Algiers and Tunis also.

All of the Barbary Coast campaign presents a moving picture to any one of even average imagination, as stirring and colorful as any ever shown on any screen; immeasurably wider in scope, immeasurably greater in depth: and with the added touches of actual truth, profound importance, and lasting guidance, to our nation, still young and relatively unsophisticated.

The "stars" of that moving picture were more numerous than might have been expected. Those stars still shine; and the brightest will still shine when every man and woman now living on the top of the thin crust of earth shall have passed to the Great Beyond. The names of the stars of the first magnitude are Preble, Decatur, Rodgers, Hull, and Somers. Other stars there were; equally brave, but not equally fortunate in gaining opportunity.

Frost shows how the navy was allowed to become so weak that Britain resorted to acts of aggression that brought on the War of 1812. He shows how our frigates, notably the *Constitution* and the United States, defeated British ships equal in size, the *Guerrière* and *Macedonian;* but how, by mere force of numbers, the British navy blockaded our whole coast, and almost stopped our sea commerce.

The Atlantic Coast being safely blockaded, the British turned their attention to our Northwestern frontier, especially the Great Lakes, Erie and Ontario, the Detroit River,

and the shores on both sides. The first operations were mainly military, and centered around those of General Hull and his projected attack on Canada. These came virtually to naught, mainly because our weak President Madison had failed to accede to Hull's request and provide a naval support in Lake Erie. Realizing its necessity later, Madison authorized the building of a small squadron to meet the already existing British squadron. This being completed, after the usual delays, its command was given to an extraordinary youngster twenty-seven years old, named Oliver Hazard Perry. He defeated and captured all the British ships, and put his name not far below that of Paul Jones on History's scroll. The kind of man he was is indicated by the fact that three weeks after the naval battle in which he had commanded as commodore, he served voluntarily in a bloody land battle as aide to General Harrison—much to the delight of the soldiers!

Frost follows this with a vivid account of the campaign on land and water around and on Lake Ontario, which Commodore Macdonough ended with his victory on Lake Champlain. He shows that the British activities on the Great Lakes were intended to co-operate with others at the mouth of the Mississippi, and aiming to acquire permanent possession of the Great Lakes and also of Maine, to establish an independent British-controlled Indian state within our borders, to prevent us from ever expanding beyond the Mississippi, and to secure permanent possession of the mouth of that river.

If the British had succeeded, if Perry and Macdonough had not defeated them on the Great Lakes, and if Jackson had not then defeated them at New Orleans, the United States of America would ever since have been, and would now be, a narrow fringe of little states stretching from the vicinity of Boston to the Northern end of Florida.

THÈORIE STRATÉGIQUE. Vol. I. By Admiral Castex. Paris. Société d'Éditions Geographiques, Maritimes et Coloniales. 400 pages with plates in color. 45 Frs.

In this first volume, the author sets forth some generalizations concerning strategy and its history. Then, after showing the importance of maritime communication in time of peace and in war, and after threshing out the burning question of the day, mastery of the seas and freedom of the seas, he defines and specifies the mission to be carried out by the naval forces of a nation at war. Finally, in a third part, the most important and most interesting, he tries to establish the rational basis for a theory of conduct of operations, such as it may be determined by good sense, military judgment, and experience of our predecessors.

But while referring, as is proper in such matters, to the history of past wars, Admiral Castex has carefully avoided spending much time on conceptions, now out of date, of war made formerly on the surface alone; he gives plenty of space in his book to the use of submarines and to aviation. He dilates considerably on the profound changes they have brought about, in our times, on the general scope of operations and even on the composition and organization of forces. Accordingly, he is led to retouch considerably conclusions that had generally been accepted before this great upheaval.

It is probable that some of the theories of Admiral Castex will be warmly discussed in view of their newness and their boldness. They are in every way worthy of serious consideration and of taking a prominent position in connection with many of the problems which stir those who follow carefully current military questions.

In addition, the author does not intend to stop where he is. He intends to take up successively in review the many factors of strategy. This first volume, therefore, is only the beginning of a collection (conceived) in vast proportions. A second volume devoted to *Manoeuvre Stratégique* has already been announced and will be published in the near future.

SECRETARY'S NOTES

The Navy and the Public

Another year has passed and the country again celebrates Navy Day. This year is especially important, for without doubt, the people understand the problems of its national defense better than ever before.

The press of the country has taken up the question and published statistics which show the relative sizes of the various navies; the President's drive for a reduction in armaments, with parity with Great Britain as a basis for discussion; the evident desire of British statesmen to come to an understanding with the United States; all these things have brought the Navy closer to the people.

And the Navy can come before the people with clean hands. It has performed as great a service as is possible in peace time in calling attention to a disastrous situation that was developing.

The general approval of the President's attitude toward the principle of parity indicates the will of the people. This country has never desired to dominate the rest of the world, nor does it want to be dominated. Parity will be a deterrent to aggression, looking at it from any point of view.

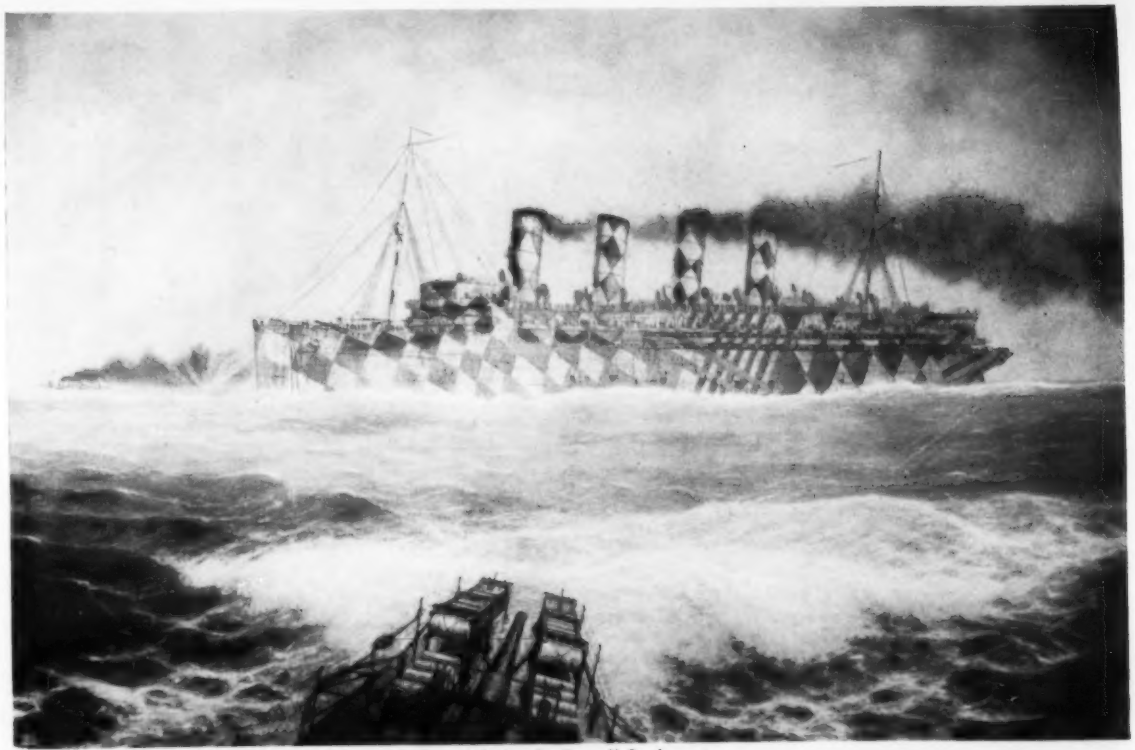
When a committee of Congress reported on the conduct of the Navy at the conclusion of the World War, it said, "All is well with the Navy." The same could be said now.

An Admiral Speaks

Rear Admiral Hilary P. Jones is as well known to the people of the country as he is to the officers of the Navy. Anyone who reads the following quotation from an interview given to the Pathé Sound News and published in the *New York Times*, of September 14, cannot help but feel that Admiral Jones breathes the spirit of the service. We believe this statement should be recorded in the PROCEEDINGS even though it will be published in newspapers throughout the land.

"There seems to be a widespread opinion in our country that naval officers are fundamentally opposed to any movement looking to the reduction and limitation of armaments. Such an attitude of mind on the part of the general public is unjust to naval officers and tends to discredit us in our earnest efforts to keep our national defense forces at the level that we honestly consider absolutely necessary for national security.

"Nevertheless we are anxious that that level shall be fixed by international agreement at the lowest point compatible with safety. We would be grossly negligent of our duty if we did not keep in mind always the defense of our country and its enormous commercial interests, spread all over the seven seas, which are now equal to and will soon surpass those of other nations.



Courtesy of the Naval Historical Foundation. From a painting by Burnell Poole.

TRANSPORT *MAURETANIA* AT SEA

Shows the fast transport, with her spectacular camouflage, on a dash through the danger zone, her decks covered with officers and men of the A.E.F., summer of 1918.

The painting was presented by the DuPont Company to the Naval Historical foundation and lent by the latter to the Naval Academy.

Photo by Francesca Bostwick

Distinguished Naval Academy Graduates in Civil Life

L. Y. Spear

GRADUATED U. S. Naval Academy in 1890. Served on the South Pacific and South Atlantic stations on the U.S.S. *Pensacola, Baltimore,* and *Charleston.*

In 1891 ordered to the University of Glasgow for special course in naval architecture and marine engineering. Commissioned assistant constructor in 1892. Graduated with the degree of B.Sc. in 1893. Served in the Bureau of Construction and Repair, Navy Department; then as assistant supervising constructor at the Union Iron Works, San Francisco, in connection with the building of the *Olympia* and the *Oregon.* Subsequently, was supervising constructor at the Moran Brothers Company, Seattle, Washington; constructor, Puget Sound Navy Yard; in charge of postgraduate course at the Naval Academy; superintending constructor, Charles L. Seaworthy, Morris Heights, and Crescent Shipyard, Elizabethport, New Jersey.

Resigned in 1902 to accept position as technical head of the Holland Torpedo Boat Company, and its parent company, the Electric Boat Company; since then has been continuously engaged in the design and production of ships and marine machinery, specializing in submarine boats and Diesel engines.

In 1904 elected vice-president and director of the Electric Boat Company. Established the New London Ship and Engine Company plant, Groton, Connecticut, in 1910, with continuous service since as president.

Vice-president and director of the Submarine Boat Corporation, since its formation in 1915.

Member of the Society of Naval Architects and Marine Engineering and of the Society of Mechanical Engineers.

"We have an inalienable right to parity in naval armaments with the strongest sea power in order that we may not be placed in a position of inferiority to any nation.

"With the sympathetic help and cooperation of many naval associates, I have worked unceasingly since the first meeting of the preparatory commission for the Disarmament Conference, held in Geneva in 1926, to find some fair basis of agreement for the limitation of armaments, and I am sure that I am speaking the mind of all thinking naval officers when I say that the navy desires a limitation that will be equitable to all concerned and will not jeopardize what we consider absolutely necessary to our national defense.

"I resent very much the term 'big navy advocates,' as applied to naval officers, and also to those members of Congress who are sincerely solicitous for the defense of our national interests. I am opposed to great armaments, because I do not believe that the taxpayers of the world should be burdened with the expense of building up and maintaining armaments beyond the minimum necessary to national security.

"Furthermore, I am convinced that competition in armaments tends to create suspicion and uneasiness in the world and thereby helps to bring on war. On several occasions in Geneva, representatives of other countries have spoken to me of the great wealth and power of the United States and of our consequent ability to build up and maintain great armaments, in contrast to conditions in their own countries.

"My reply to such observations was that while I fully recognized that we were a wealthy country and could afford to build up armaments, if necessary, our people did not want to spend their money in that way; that they preferred to spend it on schools, good roads and even on travel in Europe, rather than on huge armaments.

"I further assured them that we did not come to Geneva with any idea of holding the big stick of our wealth over any country in the question of armaments, but that, on the contrary, we were honestly trying to reach agreements that would reduce to a safe minimum expenditures on the upbuilding and maintenance of armaments.

"This is the attitude of mind of all naval officers who have really given the matter thought, for they, no less than their fellow-citizens, have at heart the well-being of the country.

"It must always be remembered, however, that there is a minimum below which we cannot afford to go because our geographical position imposes upon us the necessity of carrying on operations in far distant waters. If we should go below that minimum, we would be unable to keep any vessels operating in those distant areas. Above that irreducible minimum the question of the relative strength of naval armaments becomes a matter for consideration and agreement.

"At the disarmament conference it has been the earnest effort of all representatives of the United States, naval, as well as diplomatic, to bring the level of that relative limitation as low as possible, but we have maintained, and I believe few in this country will dispute it, that we have a right to equality with the strongest sea power and that we cannot accept by agreement a position of inferiority to any power.

"At the Geneva conference in 1927, as a result of the studies of the general board of the navy, our delegation proposed a comparatively low level of naval armaments and further stated that the United States would be willing to go as low as the most powerful nation on the sea would agree to go.

"Since that conference the navy has not changed it attitude of mind and still is anxious that some agreement for a limitation of naval armaments may be reached, but the navy in-

sists that our right to equality with the strongest sea power, in fact as well as in principle, shall be recognized as a *sine qua non* of such agreement."

Speeding up

The last month has seen some remarkable accomplishments in the matter of speed. Germany's *Bremen* showed the way in speed for passenger ships, and her *Graf Zeppelin* broke the 'round-the-world record twice in one week. Then came the British Schneider cup entry with a speed of six miles a minute in sea-planes! And a speed of 750 miles per hour is predicted!

Pretty soon there will be no incentive to travel, for we will get where we are going before we start.

Covers for the PROCEEDINGS

At the suggestion of a member we have investigated the possibility of a neat, imitation leather binder for the PROCEEDINGS. It is at-attractive and will hold an entire year's issue of the magazine. Or, if we so wish, we may have binders holding six months' issues. The price for a binder holding twelve issues would be approximately $2.00, for two binders, holding six issues each, would be about $3.25. These are subject to our buying them in quantity lots.

We would like to get comments from those members who desire to preserve their copies of the PROCEEDINGS.

The life of ships

It is an unfortunate fact, but true, that ships will wear out, or at least reach that state where repairs are unwarranted. Some fifty-seven of our destroyers will have to be decommissioned in the near future, according to an announcement by the Chief of Naval Operations. A good many of us will feel as if we were losing members of our family, we have been so closely associated with them.